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THE STORY OF ANTARCTICA



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THE STORY OF ANTARCTICA

by R. FRANK, JR. *copy sent*

F. X. Ross

ILLUSTRATED WITH PHOTOGRAPHS



for Barbara Brown

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1

ANTARKTOS

ANCIENT Greek scholars like Thales, Parmenides and Aristotle knew many facts about the world in which they lived. For one, they believed that the earth was round as a ball. Greek philosophers had come to this idea mainly through the study of mathematics and astronomy. Almost 2,000 years had to pass before this theory was proved true by the daring sea voyages of Columbus, Magellan and other explorers.

The Greeks also had some knowledge about the lands that lay beyond the borders of their Mediterranean home. For example, they knew that far to the north, at the top of the world, was a huge, cold region in which few people lived. They called this part of the world *arktos*, after the constellation of stars shaped like a bear that blaze in the northern sky. It was Parmenides (about 450 B.C.) who first suggested that the earth be divided into zones of climate—torrid, temperate and frigid. The Greeks had become familiar with the *arktos* or arctic mostly through stories brought back by travelers who, for adventure or trade, had made their way to that cold region. The

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sea voyages of daring mariners also helped them to learn about the northland. Pytheas made an astonishing sea trip that is said to have taken him to the northern limits of Great Britain. This Greek navigator brought back a great deal of information about the geography of the northern lands as well as the people who lived there.

Since there was a land mass in the north, Greek philosophers decided there must be another at the southern end of the world. If this were not so, they reasoned, the earth, being a sphere, would be terribly out of balance. This would cause the planet to wobble as it sped on its endless journey through space. The Greeks called this unknown southern land *antarktos* because it was opposite the bear or arktos. Today we know it as Antarctica.

Many centuries after the glorious Greek civilization had faded, European geographers believed strange things about the Antarctic region. Probably the most important of these was the idea that Africa, South America, Australia and some of the larger islands in the South Pacific were all part of the land mass at the southern end of the world. They thought these continents and islands stretched far south to the heart of the polar land. Early European geographers pictured this Antarctic area as gigantic in size and they called it Terra Incognita Australis—the Unknown Southern Land. This name was finally given to Australia when, for a time, that land was believed to be the mysterious southern continent. These mistaken ideas, popular until about the fifteenth century, were based largely on guesswork rather than exploration. Then, suddenly, people in Europe had a great desire to see what the world beyond their own borders was like, and the exciting Age of Exploration was born.

This colorful and adventurous chapter in the history of Western civilization took place mainly between the fifteenth

returned from their daring voyages with much information about the world as it really was. Geographers and map makers not only had to correct their charts and maps but also to change their ideas about the world as well. This was especially true of the Unknown Southern Land. The mass of new geographical knowledge also helped to fix more accurately the latitude of the Antarctic Circle. The method of locating places by latitude and longitude was used as far back as the second century A.D. by Ptolemy, astronomer and geographer.

As brave navigators pushed farther and farther into the southern half of the world, they found that Africa, South America and Australia were not part of the Antarctic region. Instead, these were discovered to be giant continents by themselves. Sailing beyond the southernmost limits of these lands, explorers reported vast stretches of ocean as far south as the eye could see. Geographers began to realize that if there was a continent in the Antarctic it must be in the remote southern part of the world, farther than anyone had yet sailed. Terra Australis, in their eyes, had also begun to shrink in size.

When Magellan set sail in 1519 with his ambitious plan to circle the world with a fleet of five ships, he passed through a narrow strip of water connecting the Atlantic and Pacific Oceans at the southern end of South America. Today, this is known as the Strait of Magellan. While the Portuguese navigator was passing through the Strait, he sighted land to the south which he called Tierra del Fuego, or Land of Fire. For a number of years it was thought that this discovery might be a part of the Antarctic Continent. But England's bold buccaneer and explorer, Sir Francis Drake, proved this was not so.

In 1577, while commanding the rugged *Golden Hind*, Drake plowed his way around Cape Horn at the southern tip of Tierra del Fuego. There was no land south of this point, only an angry ocean whose waves were whipped to white froth by gale winds.

Drake's voyage was one of the last to convince geographers that the Antarctic Continent must indeed be far away, if it was at the end of the world at all. But many years were to pass before any real effort would be made to find it. Up until the eighteenth century, explorers were far too busy uncovering the wonders of North and South America and the Far East. Then in the late 1700's the British Admiralty decided that it was time someone sailed to the southern end of the world and thoroughly searched that region for Terra Australis. They selected Captain James Cook, one of the world's great explorers at the time, to sail through the waters of the Southern Hemisphere in search of the mysterious land.

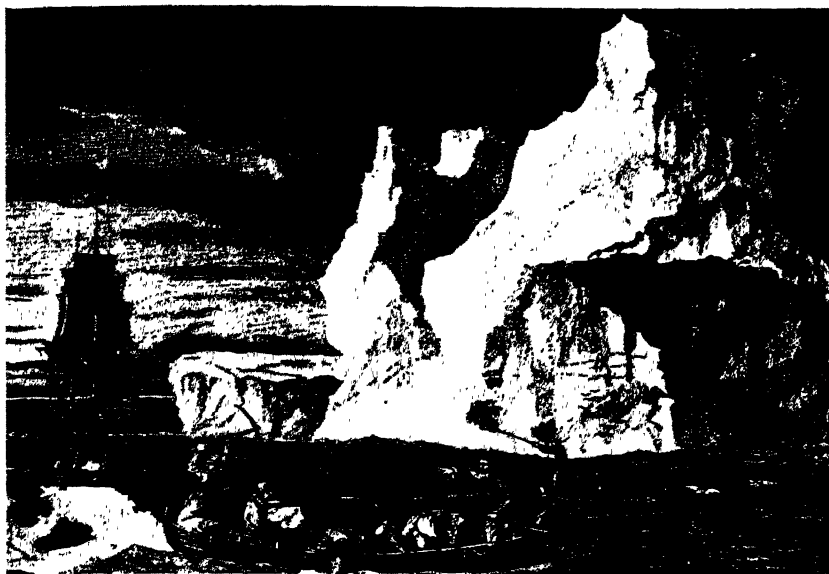
Captain Cook had just completed an expedition to the South Pacific for his government which, before it ended, took the navigator completely around the world. On this sea journey, lasting from 1768 to 1771, Cook had spent much of his time charting the coasts of New Zealand, Australia and New Guinea. Ever on the alert for new lands, especially the "southern continent," Captain Cook combed thoroughly the areas of the oceans through which he sailed. At the end of this three-year voyage the English navigator was convinced that as far as the "southern continent" was concerned, it did not exist in the latitudes which he had explored. If there was such a land, then it must be far south of the regions he had searched. This was the puzzle which the British Admiralty now wished him to solve.

Two ships were placed under Captain Cook's command for the Antarctic voyage, the *Resolute* and the *Adventure*. The English navigator chose the *Resolute* for his flagship. Leaving Plymouth, England, on July 13, 1772, Captain Cook and his men were not to see their native land again until three years later. In some ways, this might be called the first planned expedition to the south-polar region.

The *Resolute* and the *Adventure* plowed southward through the long Atlantic swells and then were turned eastward around the Cape of Good Hope, Africa. At this point Captain Cook headed his two-ship fleet in a southeasterly direction for waters never before seen by man. As the two small sail ships pushed deeper into the southern latitudes it was not long before the explorers had to put on warmer clothing. Day by day the temperature got colder and the seas stormier. Time and again the two ships were driven apart by storms. In fact, throughout most of the voyage the *Resolute* and *Adventure* were seldom together.

On January 17, 1773, Captain Cook crossed the Antarctic Circle. This was the first known entrance into the south-polar zone by man. The English explorer had added another triumph to an already long list of exploration victories. Writing later about this historic happening, Captain Cook said: ". . . on the seventeenth, between eleven and twelve o'clock [A.M.] we crossed the Antarctic Circle . . . latitude 66 degrees 36 minutes 30 seconds south . . . we could see several leagues around us; and yet we had only seen one island of ice since the morning." Later that day Captain Cook was able to report an entirely different picture about icebergs or "islands of ice" as he called them. ". . . steering to the south, we observed the whole sea in a manner covered with ice. . . ."

This voyage through stormy Antarctic seas was no pleasure cruise for Captain Cook and his men. They were chilled by freezing temperatures and battered by gales, snow and sleet. But worst of all was the constant danger of crashing into icebergs. The wooden ribs and sides of the explorers' ships were not strong enough to take the blows of crushing ice floes. Had one of the icebergs struck them, their weak-hulled vessels would surely have been dashed to pieces. It took expert seamanship and maneuvering to avoid hitting the menacing ice



British Museum

floes and bergs. But not all the ice floes were dangerous. The blocks of floating ice provided the explorers with fresh drinking water.

Whenever the need for fresh water arose, a boat was put over the side and rowed to ice floes small enough for the man to lift out of the water. Brought up to the deck of the mother ship, the ice floes were left to drain for awhile so that a thin coating of salt would melt away. Then the ice was chopped into pieces, some being stored in wooden barrels while others were melted immediately for the water casks. The explorers found the drinking water made from ice floes "perfectly sweet and well-tasted."

The need for enough good drinking water was somewhat of a problem aboard ships during the days of sail when long sea voyages were made. With his many years of sailing long lonely stretches of strange seas, Captain Cook was all too familiar with this situation. He was greatly impressed, therefore, on his Antarctic voyage when he discovered that ice floes could be



National Maritime Museum, London

Captain James Cook, the first officially to explore the Antarctic.

used to solve the water problem. In his journals about the expedition, Captain Cook said it was “. . . the most expeditious way of watering I ever met with.”

After having crossed the Antarctic Circle, Captain Cook pressed southward through the ice field as far as he could go before the frozen obstacles closed in on his ships. The explorer was forced to turn back after reaching as far south as latitude

67 degrees 15 minutes south. At this point Cook reported seeing nothing but a solid field of ice stretching in an east, west and southerly direction. There was no opening in the ice anywhere through which to press the ships farther. Since his southward path was now blocked and the Antarctic winter settled in, Captain Cook saw no reason to remain in the area longer. He ordered the *Resolute* headed east to New Zealand where he planned to rest his crew and re-supply the ships.

Captain Cook and his fellow explorers left New Zealand for the Antarctic once again on November 26, 1773. Almost a month later, on December 20, they crossed the Circle for a second time into the realm of the South Pole. They sailed through hundreds of miles of rough seas but nowhere were they able to sight land or, more particularly, the "southern continent."

Again he met pack ice, frozen sea water several feet in thickness that extends around the continent for a number of miles from Antarctica's shoreline. Just as the first time, the ice proved to be an impassable wall to Captain Cook. There wasn't an opening to be seen anywhere along the fringe of the ice belt through which a ship might sail. Even had he found an avenue through the pack ice, there is some question as to whether he would have pressed through it. The many years at sea exploring new areas of the world had tempered Captain Cook's boldness with good common sense.

Standing off and examining this enormous area of floating blocks of ice—some were truly giants towering three hundred feet in the air and as big around as three miles—the English navigator observed that while it might be possible to sail farther south than he had, ". . . it would have been a dangerous and rash enterprise." This was good judgment on Captain Cook's part because in later years when Antarctic exploration was in full swing, ships stouter than his were trapped in the

pack ice and crushed as easily as one can crush an egg with two fingers. Captain Cook and others of his expedition believed the ice field must run all the way to the South Pole itself.

With the way southward blocked for a second time by the pack ice, Captain Cook decided that it was useless to explore this far south in the Antarctic region. His farthest southerly point this time was latitude 71 degrees 10 minutes south. The decision to turn back north to warmer weather was cheered by the ships' crews. Captain Cook himself admitted that he shared the crews' feelings. Although he had gone farther south than had any man before, he did not regret having his plan interrupted now. ". . . as it, in some measure relieved us—at least, shortened the dangers and hardships inseparable from the navigation of the southern polar regions." This great navigator and his men had had all they wanted of the fury of Antarctic weather.

During the course of their second journey below the Antarctic Circle, the explorers were struck by a wild gale that left them battered and bruised. The ships were pelted with snow and sleet which quickly froze to the rigging. Ropes were turned into steel-like wires by the ice and sails became as stiff as metal. These conditions made it terribly difficult to maneuver the ships and were a torture to the men.

After reaching a more favorable weather zone, Captain Cook's expedition slowly worked its way eastward exploring the Southern Pacific Ocean. This journey proved more fruitful than the one below the Antarctic Circle. A number of new islands were discovered, including New Caledonia, perhaps the most important. Eventually the explorers worked their way around the southern tip of South America and on to the island of South Georgia. Here the expedition dropped anchor to rest and to take possession of the island for Great Britain.

In later years, desolate, rocky South Georgia became an important center of activity for seal and whale hunters and a starting point for several Antarctic expeditions.

After leaving South Georgia Captain Cook headed toward the West Coast of Africa and then turned north for home. The explorers reached Plymouth, England, on July 29, 1775.

Although Captain Cook's Antarctic expedition had failed to discover the elusive Terra Australis, his mission was not without some accomplishments. Not only had this skillful navigator crossed the Antarctic Circle for the first time, indeed, three times was his score on this voyage, but he had sailed farther into the southern end of the world than anyone else before. Captain Cook's expedition had also taken him completely around the world. Although this had already been accomplished by Magellan, the Englishman's voyage was different because he sailed from west to east. The Portuguese navigator traveled from east to west. Unknowingly, while circling the world, Captain Cook had also sailed around the Continent of Antarctica which still awaited discovery.

Aside from matters of exploration, Captain Cook's pioneering Antarctic voyage produced a good deal of scientific information. The ocean currents in the south-polar region had been studied and periodic tests of the temperature of the water were made. At one time the explorers recorded a temperature of 32 degrees Fahrenheit, normally the freezing point of water, at a depth of 600 feet. But the most interesting information, perhaps, which Captain Cook brought home concerned bird and marine life.

They had seen penguins, of course, and the large, brown-colored albatross. These birds flew about the ships almost the entire time the explorers were near the ice fields. Various kinds of petrels were also observed and some were caught for closer study. The expedition named one of these birds the

Antarctic Petrel because it was believed native to the region. This particular kind of petrel was about the size of a large pigeon, colored brown on the top and white on its underside. Captain Cook and his men were also often amused by great numbers of seals and whales that splashed about near the ships. In the next fifty years or so these creatures were destined to play an important role in the history of Antarctica.

The birds were a particular puzzle to Captain Cook while he sailed along the edge of the pack ice. Because they were hundreds of miles from any known land, he wondered where they nested. The explorer could only guess that farther south, beyond the mammoth field of ice which had barred his path, there must be a land mass.

Writing in his journal about this undiscovered land, as well as the entire Antarctic region which he had seen, Cook pictured this part of the world in the darkest colors. "Countries condemned to everlasting rigidity by Nature, never yield to the warmth of the sun, for whose wild and desolate aspect I find no words; such are the countries we have discovered; what then may those resemble which lie still further to the south? Should anyone possess the resolution and the fortitude to elucidate this point by pushing yet further south than I have done I shall not envy him the fame of his discovery, but I make bold to declare that the world will derive no benefit from it."

For geographers, Captain Cook's voyage was final proof that the "southern continent" must be at the very southerly tip of the world if at all. The English navigator had circled the lower part of the Southern Hemisphere without sighting any new continent. If there was land in the Antarctic, then surely it must be as Captain Cook himself imagined—cold, barren and unfriendly. Years later, a small army of courageous, venturesome men proved that this was true.

2

ANTARCTICA DISCOVERED

FOR MORE than fifty years after Captain Cook's Antarctic voyage, there were few visitors to that part of the world. The Englishman's story of the wild storms, biting cold and failure to find any land was probably a discouragement to other explorers. But all this changed rather suddenly in the early 1800's when seal and whale hunters poured into the south-polar region.

In the eighteenth and for a good part of the nineteenth centuries whale and seal oil was widely used for lighting purposes. Seals were also valued for their skins which brought high prices, especially in China. Whaling and sealing was a rich industry, and many ships left busy ports in America and England in search of these inhabitants of the sea. Captain Cook reported sighting great numbers of seals and whales in the Antarctic waters. But oddly enough this information aroused little interest among the hunters of whales and seals. It was news about the discovery of the South Shetland Islands that really sparked American and British sealers and whalers into action.

Captain William Smith, an Englishman and skipper of a

cargo ship that sailed between the East and West Coasts of South America, found the Shetland Islands on February 19, 1819. On one of his voyages around stormy Cape Horn, Smith decided to steer a course far south of his usual route. One day, a group of mountainous islands topped by snow-capped peaks rose out of the sea off his bow. Smith's charts made no mention of these islands so he knew he had made a discovery. As his ship sailed closer, the Englishman could see that the islands were a jumble of rocks without a sign of plant life. Instead, the rocky shore and low cliffs seemed to be alive with the fat, shiny bodies of seals. The creatures had turned the islands into a rookery and were massed all over by the thousands.

Great rivalry existed between British and American seal hunters, and Captain Smith did his best to keep his discovery secret. But news about the islands leaked out somehow and it wasn't long before the South Shetlands became the goal of rival fleets of Yankee and British seal hunters. These daring men traveled a long way from home to reach the rich nesting grounds. The islands are some 450 miles southeast of Cape Horn and a little more than fifty miles from Antarctica itself.

Sealers were fearless, strong and marvelous seamen. For days on end they lived through freezing cold, snow and rain with little complaint. They risked their lives in tiny, wooden ships about eighty feet long and 200 tons in weight, sailing through seas which have been called the stormiest in the world. Sometimes there were wrecks on gale-swept, desolate islands where the only food might be penguins or seals. Survivors, if there were any, had to wait for months sometimes until a passing ship rescued them. There was no radio in those days with which to call for help. But the seal hunters put up with these terrible hardships because the prizes were high and fortunes could be made after one or two voyages.



Mystic Seaport Photo. Louis S. Martel

Seal hunters in the Antarctic.

While searching for seal rookeries, the hunters poked their little ships into strange bays, sailed through uncharted straits and discovered new land. Whether they wished to or not, they had also become explorers. How much of the Antarctic region they might have uncovered while doing this is still uncertain. We do know, however, that the Antarctic Continent was first sighted by these bold seal hunters.

Just who the man was who first saw Antarctica is a question that has left historians greatly puzzled ever since the days of the south-polar seal hunters. Americans have long rested their case on the voyage of a young Yankee skipper, Captain Nathaniel Brown Palmer. A veteran seaman, even though

only twenty-one years old, Captain Palmer had come to the rich Antarctic sealing grounds in command of his tiny, forty-four-ton sloop, *Hero*. He was part of a fleet of five sealing vessels that had sailed out of Stonington, Connecticut. During the early nineteenth century, this little New England town was a busy home port for large fleets of sealing and whaling ships.

In the fall of 1820, Captain Benjamin Pendleton, in overall charge of the Stonington fleet, ordered Captain Palmer to scout for new seal rookeries and to keep his eyes open for a good harbor where their ships would have a safe anchorage. The adventurous young skipper took his little *Hero* along the southern shores of the Shetland Islands. One account tells us that he came to Deception Island, slightly to the south of the main Shetland group, and found an excellent harbor. Captain Palmer anchored and went ashore to look for seals and to collect penguin eggs. He climbed a rocky hill and, looking out over the sea to the south, saw mountainous land on the horizon. Smoke drifted skyward from one of the distant peaks which meant that a live volcano was present.

Captain Palmer returned to the *Hero* and set sail for the newly sighted land, no more than fifty miles away. As he approached closer and sailed along the rocky, forbidding shoreline, the Yankee seal hunter looked upon rugged mountain ranges that rose almost from the edge of the sea to great heights. For the most part, the peaks were heavily covered with snow and ice, and the whole scene was one of great desolation. Captain Palmer was looking at Antarctica, the seventh and last continent in the world. He had discovered the peninsula that curves northward like a crescent from the mainland toward the southern tip of South America. Today, American map makers call this part of Antarctica Palmer Land, in honor of its discoverer.

British map makers do not agree with Americans when it comes to naming this Antarctic peninsula. They call it Graham Land, after a one-time head of the British Admiralty. According to their views, Antarctica was first sighted by a Lieutenant Edward Bransfield of the English Navy who, during the fall of 1820, was exploring the same waters as Captain Palmer.

As Captain Palmer neared Deception Island on his return trip, a thick fog suddenly rolled over his ship, blotting out his vision and forcing him to drop anchor. When the air cleared, the Yankee skipper was astonished to find himself anchored between two strange vessels. He immediately hoisted the American flag and was answered in a similar way with the Russian colors. Shortly thereafter a boat was put over the side of one of the Russian ships and rowed toward the *Hero*. A messenger climbed aboard the American sloop with an invitation from the Russian Commander to Captain Palmer to visit his flagship. The Yankee skipper accepted and remained for almost an hour.

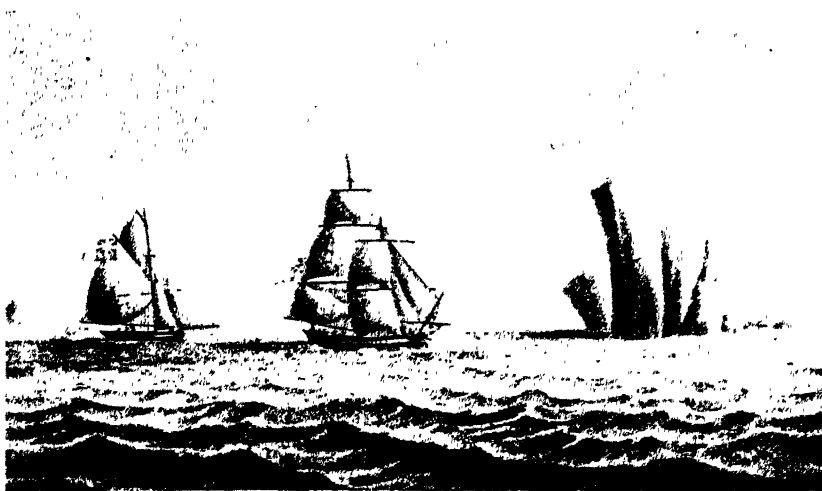
Captain Palmer found he was in the presence of Admiral Fabian von Bellingshausen who had been sent on a south-polar exploration mission by the Russian Emperor Alexander I. The Russian explorer had two ships under his command, the *Vostock* and the *Virni*. The expedition had left Kronstadt on July 15, 1819, and for more than a year had traveled through an enormous area of the Antarctic region. At one time the Russians had sailed continuously for over two months below the Antarctic Circle close to the edge of the pack ice. Captain Palmer, on his part, told the Russians as much as he knew of the area he had been exploring. Rather proudly, he described the land south of their anchorage which he had just discovered.

Admiral Bellingshausen had also made some discoveries

on a voyage that was a triumph of seamanship and exploration. He had found an island off the frozen continent which he called Peter I Island and some land he named Alexander I Land. Later explorers found this to be an island also. The former was sighted at the farthest southernly point that had yet been reached in the Antarctic region. An enormous field of ice prevented the explorers from getting closer than forty miles to Alexander I Land which ran in a southwest direction as far as the eye could see. But even at that distance the clear Antarctic air made Alexander's snow-capped mountains stand out very plainly.

By 1824 the Russian polar expedition had long since returned home and so had most of the seal hunters. The latter had carried on such a ruthless slaughter of the defenseless creatures that the seals had almost completely disappeared. It was no longer profitable to send ships to these distant, stormy parts to hunt for them. One of the last of the sealers to visit the Antarctic was an Englishman, James Weddell, who helped to add a bit more to the geography of the south-polar region.

Weddell was a one-time naval officer who turned to seal hunting as a much more profitable occupation. But he also had explorer's blood in his veins, and when he wasn't hunting seals he was searching for new lands. Weddell left England in September, 1822, for the Antarctic, with two small ships, the *Jane*, which he commanded, and the *Beaufoy of London*, skippered by Captain Matthew Brisbane. In February of 1823, during a lull in seal hunting, Weddell made the deepest penetration of anyone up to that time in the Antarctic area. Weddell crossed the Antarctic Circle, found and sailed southward through a sea that now bears his name, to a point at latitude 74 degrees 15 minutes south. He had traveled fourteen miles beyond the record set by Cook.



British Museum

Brig *Jane* and cutter *Beaufoy* in the latitude of $74^{\circ}15'$ south.

More often than not, Weddell Sea is jammed with impassable ice fields. When the Englishman made his voyage of discovery he was lucky to find the sea unusually free of pack ice. For this reason Weddell had the mistaken idea that it would be possible to sail directly to the South Pole.

Besides discovering one of the two largest indentations in the Antarctic continent, Captain Weddell also brought back a good deal of information about the bird and marine life. He returned with a rare kind of seal which has since been called the Weddell Seal.

After the seal hunters, there was little special interest in the southern end of the world until about 1840 when three nations, the United States, France and Great Britain sent exploration expeditions to the Antarctic. The American government organized a fleet of six naval ships for its polar venture, called the United States Exploration Expedition. Youthful Lieutenant Charles Wilkes was put in command of the expedition which, while made up largely of navy men, also had a few

civilian scientists, geologists and botanists. Lieutenant Wilkes left America with his fleet on August 19, 1838, with broad orders to explore as much as possible of the Antarctic region.

The *Vincennes* and the *Peacock* were the two largest ships in Lieutenant Wilkes' Antarctic fleet. The *Relief*, a supply ship, the *Porpoise*, the *Sea Gull* and the *Flying Fish* made up the rest. The last two were the smallest and were brought along for exploring inshore waters. The American squadron made two voyages off Antarctica's coastline. The first was very brief. Leaky ships and command problems among some of his officers had forced Lieutenant Wilkes to spend a good deal

The U.S.S. *Vincennes* surrounded by Antarctic icebergs.

U.S. Navy



of time in South American ports. When the expedition finally arrived in the south-polar region it was late February. By this time the Antarctic summer and good weather were almost at an end.

Lieutenant Wilkes sailed in the vicinity of Palmer Land for several weeks and sighted a few tiny offshore islands. Furious Antarctic gales then drove the American ships north to the shelter of South American harbors before any further exploring could be done. The expedition reached Valparaiso, Chile, after being scattered by the rough weather.

This first short Antarctic cruise was a painful experience. Lieutenant Wilkes and his men realized that their polar-exploring mission was not going to be a pleasure cruise. They discovered that their ships were poorly prepared for battling rain, sleet, blizzards and mountainous, ice-filled seas. Their personal equipment, clothing in particular, gave them little protection against the cold. The men of the Norfolk naval base who had readied the ships for the polar voyage had not done a good enough job. Events proved that in addition to shoddy workmanship, they knew little, if anything, about readying ships for polar seas.

While waiting for another Antarctic summer to come around, Lieutenant Wilkes took his squadron on an exploration voyage among the islands of the South Pacific. Late in November, 1839, the American ships anchored in the harbor of Sidney, Australia, where preparations were made for a second journey to the Antarctic. Wilkes was grimly determined that his mission would succeed in spite of all handicaps.

Crew members were put to work making the *Vincennes*, the *Peacock* and the rest of the fleet as weatherproof as possible. Portholes were made extra tight, while openings in the deck were caulked and then covered with canvas and tarred. In some places sheets of lead were placed over the

canvas. To help keep the officers' and crews' quarters warm, a clever door-closing system using weights and pulleys was worked out. The doors shut automatically so there was less chance of heat escaping if someone forgot to close them. Crude stoves were built and placed at various points within the ships. These were used not only for warmth but also for drying clothes after the sailors finished working on deck in stormy weather. Lieutenant Wilkes had thermometers placed in different parts of the ships so that the temperature could be constantly checked.

When all preparations were completed, the fleet left Sidney on December 29, 1839. It was on this second Antarctic voyage that the United States Exploration Expedition accomplished its most important work. In the course of their travels, Lieutenant Wilkes and his men encountered a full measure of adventure. At one time while cautiously poking their way through fields of ice, the Americans were trapped by a blinding fog. Only by the utmost good luck and skillful seamanship were they able to get out of their dangerous predicament even after the fog had lifted.

A hair-raising experience occurred on another occasion when it became necessary to anchor one of the smaller vessels to an iceberg. In order to secure the ship, the anchor had to be rowed to the berg and then carried up onto the icy mooring. After the sailors had fastened the hook, they prepared to return to their ship. But the calm water through which they had rowed had changed into a swirling ice-filled mass. The way to the ship was barred and it looked as though the men would be marooned on the berg. Suddenly a last, desperate chance offered itself. They spotted a passageway between two large bergs beyond which lay clear water and their ship. If the men were not to freeze to death, they had to try to get through that narrow icy opening before the bergs floated to-

gether to close the gap. The seamen pushed their small boat off the ledge of ice on which it had been resting, jumped in and began to row frantically. They were halfway through the icy canyon when the giant bergs, forced closer together by the action of the water, caught the boat in a squeeze. The immense pressure of these two floating mountains of ice buckled the sides of the boat. Water began to pour in. For a few seconds it seemed that all was lost. Suddenly the icebergs parted. Losing no time, the Americans pulled on their oars with all their might and shot out from between the icy jaws of death to their ship and safety.

By February of 1840, after months of battling cold, dangerous icebergs and raging gales, the members of the United States Exploration Expedition were physically exhausted. The doctors aboard the ships reported a long sicklist and urged Wilkes to turn for warmer waters. Much as he disliked to, the leader of the expedition had to agree. On February 21, Lieutenant Wilkes gave the order to head the ships north toward a friendlier climate. It was a happy bit of news to the crews. Although the Americans had carried out their explorations under great hardships, they had managed to collect a good deal of information about the Antarctic region.

Perhaps the most important bit of knowledge which Lieutenant Wilkes brought back was that Antarctica was a huge continent and not a series of islands as was generally believed at the time. He also reported sighting mountainous land at various points as he cruised along the shore of Antarctica. Some of these claims led to arguments. Later explorers were unable to find land at certain locations of latitude and longitude claimed by the American naval officer. In a few cases explorers sailed their ships over the exact spot where Lieutenant Wilkes reported seeing land. In several instances it appeared that he might have been a victim of unusual light-

ing effects that prevail in the Antarctic. Almost all explorers, from the time of Lieutenant Wilkes to the present, have reported the strange play of light which gives the illusion of land on the horizon. Aside from the disputed claims, Lieutenant Wilkes did explore for the first time a long stretch of Antarctica's coastline, ranging through 60 degrees of longitude. Today, this section of the south-polar continent is called Wilkes Land.

At about the same time that the American expedition headed for the Antarctic, France also sent an exploration fleet to that part of the world. This consisted of two ships, the *Astrolabe* and the *Zelee*, both wonderfully equipped for scientific work. One of France's most experienced explorers, Admiral Jules Sebastian Dumont d'Urville, was placed in command. The two ships left Toulon in September of 1837 and by January of the following year were in Antarctic waters. The original plan of the French expedition was to sail through the sea which James Weddell had discovered and explore that portion of the Antarctic world. When they reached the Weddell Sea, however, they were unable to travel very far south because of the impassable pack ice.

Admiral d'Urville then changed his plans and headed for the South Pacific Ocean, where he explored and studied the ocean currents and marine life for almost a year. In January of 1840 the French explorers sailed out of the port of Hobart, Tasmania, and once again headed for the Antarctic continent. This time it was decided to explore a region of the frozen continent that lay directly south of Tasmania. It was approximately the same area where Lieutenant Wilkes and his fleet were voyaging.

January 21 dawned bright and clear, and off in the distance the French explorers sighted towering white cliffs. As the ships drew closer, the cliffs turned out to be ice. Admiral d'Urville

would have liked to find out what lay beyond this barrier, since he felt quite positive that there must be land. To show how certain he was, he called the area Adélie Land, in honor of his wife. Some expedition members succeeded in reaching the foot of the ice cliffs by boat where they found a midget kind of penguin. This south-polar inhabitant was also named after the Admiral's wife.

While the American and French expeditions were prowling the waters off the Antarctic continent, a third group was making last-minute preparations at Hobart, Tasmania, to join the exploring activity. This was a British expedition under the command of Admiral Sir James Clark Ross, an experienced polar traveler. Much of his knowledge about the polar zone had been gained in the Arctic. He was the first of the explorers to reach the North Magnetic Pole.

Shortly after Admiral Ross discovered and fixed the position of the North Magnetic Pole, scientists were able to make a rough estimate of the South Magnetic Pole's location, latitude 66 degrees south, longitude 146 degrees east. Karl Friedrich Gauss was a leader in this work. An authority on the earth's magnetic forces, he had originated a formula by which it was possible to calculate the forces of magnetism at any spot and time on the earth's surface.

The Antarctic expedition which Admiral Ross commanded was well equipped and prepared to meet the expected hardships in the south-polar region. Two stout ships, the *Erebus* and the *Terror*, were used to transport the explorers. These were one-time naval vessels which had been specially built for hurling bombs at short range against land forts. To carry out this fighting chore the ships had been made extra strong. Since it was known that dangerous icebergs and pack ice would be encountered in the Antarctic, the hulls of the boats

were strengthened still more. Both ships weighed a little more than 300 tons each.

After a long sail from England, the Ross expedition finally arrived at Hobart, Tasmania, where the party rested and fresh supplies were put aboard the ships. While anchored here, Admiral Ross heard news of the explorations being carried out by Lieutenant Wilkes and Admiral d'Urville. He was disappointed, of course, for he intended to look for the South Magnetic Pole in the same area. Because he did not want to travel through the same territory, Admiral Ross decided to do his exploring farther east, in the neighborhood of longitude 170 degrees south, and to approach the South Magnetic Pole from that direction. This part of Antarctica lay south of New Zealand. By November of 1840, all the preparations of the expedition were completed. Anchors were hauled up on the thirteenth of that month and the *Erebus* and the *Terror* put out to sea. With sails bulging and the rigging singing before a stiff breeze, the two ships were soon plunging through the wild Antarctic seas.

Admiral Ross kept to his new plan of sailing south and east until he neared the 170 meridian. At this point he veered more sharply to the south, and on New Year's Day, 1841, his two ships crossed the Antarctic Circle. The expedition now met one of the major obstacles of the Antarctic—pack ice. Still the Admiral kept to his southerly course, following water leads in the ice field. He knew that his ships were exceptionally strong and was confident that they could meet the challenge of the ice pressure.

After four days of slow, cautious sailing, the expedition got through the pack and came out into an open, ice-free sea. This was an unusual victory for Admiral Ross. He was the first of the Antarctic explorers to get through the pack ice successfully. Continuing farther into the newly discovered sea,

Admiral Ross broke Weddell's mark for reaching the most southerly point on the face of the globe when the *Erebus* and the *Terror* crossed latitude 74 degrees 20 minutes south.

By the end of January, the British expedition was plowing through the ice-free sea on a more westerly course, in the direction of the South Magnetic Pole. There were no more ice obstacles as far as they could see, and the expedition members, from the Admiral down, were almost certain that they would reach their goal. But the hopes of the explorers changed quickly to doubt when land suddenly loomed on the horizon.

Drawing closer to their discovery, the explorers were astonished to see enormous mountain ranges with peaks that towered 10,000 feet into the sky. Some of these were covered with snow, while others showed a bare rocky surface. They called this rugged land Victoria Land, in honor of the reigning Queen of England. It was such a formidable land barrier that the Admiral changed his course to the south again. He had to admit defeat about reaching the South Magnetic Pole. This objective, the explorer knew, lay some 500 miles farther west beyond the impassable towering mountains of Victoria Land.

During the course of this voyage two mountain peaks were sighted soaring high above surrounding fields of ice and snow. These were promptly named Mt. Erebus and Mt. Terror, after the expedition's ships. Mt. Erebus proved to be an active volcano belching flame and smoke at the time of discovery. In later years, another Englishman and famous South Pole explorer, Captain Robert Falcon Scott, found that the twin peaks were located on an island which he named after Admiral Ross. For several days after changing course, Admiral Ross and his fleet sailed along the coast of the new-found land until once more his way was blocked, this time by a massive wall of ice.

Later, in writing of his Antarctic adventures, Admiral Ross

told about his meeting with this gigantic ice cliff as his ships sailed closer and closer. "We perceived a low, white line extending from its eastern extreme point as far as the eye could discern to the eastward. It presented an extraordinary appearance, gradually increasing in height as we got nearer to it and proving at length to be a perpendicular cliff of ice, between 150 and 200 feet above the level of the sea, perfectly flat and level at the top and without any fissures or promontories in its own seaward face." This ice barrier proved to be the Admiral's most important discovery and today bears his name. Of all the many unusual features known about Antarctica, the Ross Barrier is probably the most famous.

Hoping that the massive wall of ice would show an opening through which he could send his ships to the south, Admiral Ross sailed along its face to the east. For more than 300 miles the expedition followed the seaward edge of the ice wall, but at no point could a passageway through it be found. The British explorer was convinced that it was no more possible to get through the ice barrier than it was "to sail through the cliffs of Dover."

Realizing that it was useless to hunt farther for a passage to the south, Admiral Ross ordered his two ships turned around to retrace their route westward. It was important now that they get out of the newly found sea before it became choked with pack ice. The Antarctic summer of 1841 was coming to an end. The expedition had one dangerous experience. They were caught in an ice jam which carried them helplessly toward a wall of giant icebergs. They were saved from destruction at the last moment when a wind arose and blew them clear of the bergs.

There is little doubt that Admiral James Ross was the most successful of the early Antarctic explorers. His discovery of the sea and the ice barrier which today bear his name was

one of the most valuable additions that had yet been made to knowledge about the Antarctic. For future south-polar explorers he had pioneered the easiest route to Antarctica with the discovery of the Ross Sea as well as the closest starting point for the South Pole itself. Two later visits to the Antarctic region by Admiral Ross failed to produce anything nearly as important as the results of his first voyage.

For more than fifty years following the Antarctic explorations of Admiral James Ross, there was very little interest in this area of the world. For the most part, the only people who came to the south-polar region during this time were the whalers. Whale hunters found the Antarctic waters just as rich a hunting ground as had the sealers. Even today catching whales in that part of the world is a profitable, active business. In the late 1890's, whalers helped to bring about a new interest in exploring the Antarctic. Their visits to the south-polar region led to the first landing on Antarctica.

This historic event took place in January of 1895 when members of the Norwegian whaling ship, *Antarctic*, were prowling the waters off Victoria Land. Their luck had not been too good and time hung heavy on the crew's hands. The whalers were not far offshore from mountainous Victoria Land at the time and there was a lively curiosity among them about the rocky, snow-covered land. The crew's interest became so great, it was decided to try to make a visit ashore. A protected cove was found for their ship as well as a safe-looking beach to land upon near Cape Adare, the northernmost point of Victoria Land first sighted by Admiral Ross.

A little past midnight on January 24, with a calm sea and light breeze, a small boat was put over the side of the *Antarctic*. In the shore party were Captain Kristensen, C. E. Borchgrevink, H. J. Bull and one crew member. Bull had come to the south-polar world with the whalers as a passenger.

The men rowed for about an hour through water filled with countless small chunks of ice. The shoreline finally appeared and the boat was run up on a pebbly beach while the explorers leaped out. The last of the world's continents had for the first time been invaded by man. If earlier explorers had any idea of making a landing, severe ice conditions had prevented them. The Norwegians were lucky to be at a point off Antarctica's coast when there was little ice to interfere with their plans.

H. J. Bull, who afterward wrote a book about his Antarctic adventure, said that their feeling on "being the first men who had set foot on the real Antarctic mainland was both strange and pleasurable." The visitors were not alone as they came ashore. They were greeted by thousands of penguins covering almost every inch of the ground. Even the rocky slopes rising 900 feet above the explorers swarmed with the odd birds. The penguins filled the air with their noisy cries of greeting. But the Norwegians quickly discovered the cries were angry protests rather than friendly greetings. As the four men pushed their way through the swarms of penguins the birds stubbornly refused to move. They pecked with their sharp beaks at the heavy sea boots of the visitors and beat at them with their powerful flippers.

For almost two hours the explorers tramped about a tiny patch of Antarctica. Although the penguins were the main attraction, a sharp lookout was kept for other interesting objects. The Norwegians spotted some lichens, one of the lowest forms of vegetation, growing on odd-colored rocks. The explorers broke off samples of rock with a sledge hammer. These specimens along with several penguins were taken home to Norway for further study.

Before leaving, the explorers put up a pole to mark their historic landing. A box, painted with the Norwegian colors,

was fixed to the pole. On the cover of the box they wrote the name of the ship and the date of their landing. Captain Kristensen and his three companions then piled into the rowboat to return to the whaling ship.

Several years later, in 1899, a British expedition came to this same Cape Adare region purely for exploration. This group of men was the first to spend a winter on the Continent of Antarctica. Carstens Egeberg Borchgrevink, who had been with Captain Kristensen on the *Antarctic* and among the first to set foot on the frozen continent, led this British party. The Englishmen had been brought down from England aboard the *Southern Cross*. When the landing chores were completed, the ship headed out of the pack ice for New Zealand to pass the winter. The *Southern Cross* was to return the following summer to pick up the explorers.

Borchgrevink and his nine companions proved that it was possible for a man to live through the fierce cold and storms of an Antarctic winter. Aside from this achievement, the expedition did little else. While the rocky nooks and crannies of the location in which the explorers had set up their huts gave excellent protection against storms, they also proved to be a handicap. Cape Adare that winter was struck by a succession of furious blizzards. These, together with the mountainous surroundings, kept the explorers penned up. Although they had sleds and Eskimo dogs and two Laplanders to take care of the animals, members of the expedition were unable to leave their storm-bound area for trips inland.

Although Borchgrevink and his companions were the first to spend a winter camped on the Antarctic Continent, they were not the first to go through the hardships of a South Pole winter. This experience fell to a Belgian expedition, led by Commander Adrien de Gerlache, that spent the winter aboard an ice-bound ship.

The Belgian expedition was a most unusual group. Scientists and crew came from a number of different countries—America, England, Norway and Belgium, among others. Several of the members in later years were to become famous explorers on their own. The first mate of the *Belgica*, for example, was Roald Amundsen. In 1911 he came back to Antarctica to discover the biggest prize that continent had to offer—the South Pole. Another member to become famous, unfortunately in an unhappy way, was Dr. Frederick A. Cook of Brooklyn, New York. He claimed to have beaten Admiral Peary to the North Pole when actually Cook never reached the top of the world.

Commander Gerlache and his south-polar party left Antwerp, Belgium, in August of 1897 on the *Belgica*. This boat had been built in Norway and was especially strengthened to battle pack ice and icebergs. After a brief stop at Tierra del Fuego, South America's southernmost city, Gerlache and his men finally reached the vicinity of Palmer Land in January of 1898. After leaving South America their days at sea were plagued by one violent gale after another. During a lull in the stormy weather the expedition found a strait off the northern tip of Palmer Land which they charted and called Gerlache Strait.

However, the explorers continued to be hounded by fierce gales and, in an effort to get out of the storm area, they kept heading southward along the western edge of Palmer Land. On February 15, the Antarctic Circle was crossed and the expedition was soon in the midst of the pack ice. By the first of March the explorers had reached as far south as 70 degrees 20 minutes south latitude in the Bellingshausen Sea. By this time the Antarctic summer was almost over. The explorers were in a far more perilous position than they realized.

The *Belgica* managed to crunch its way a few more miles

south until, on March 3, the ship was stopped by ice. The explorers were still not worried about their situation and waited patiently for the ice to break up—which it never did. By the second week of March everyone aboard the *Belgica* knew that they were trapped in the ice.

Gerlache and his men were not prepared to live through an Antarctic winter. There were not enough stoves aboard ship to keep the interior warm, and the men lacked proper cold-weather clothing. Wherever blankets and canvas could be spared, the explorers cut these up and sewed them into crude jackets. There was lots of food on board but not the kind to prevent an outbreak of scurvy. Scurvy, a sickness brought on by poor diet, was greatly feared by explorers of the seventeenth and eighteenth centuries. Even as recently as the early decades of this century, scurvy was still causing polar explorers a great deal of trouble. The disease breaks down body tissues and causes festering sores. A victim's teeth may be loosened and fall out. If not checked in time, scurvy can bring on death. Fresh fruits, especially the citrus variety, and meats are the remedies for this dreadful disease.

Dr. Cook, who cared for the medical needs of the explorers, was well aware of the need for fresh meat if the expedition was to survive the ordeal of an Antarctic winter. He urged that small hunting parties be sent out to scour the ice field for penguins and seals, and these became part of the ship's regular food stores. Although few if any of the explorers cared for penguin and seal meat, they ate it after stern warnings from Dr. Cook. One of the crew members hated penguin meat so much he refused to touch it until he was almost at death's door.

On May 17 the Gerlache expedition had its last view of the sun. For more than two months the explorers lived in the gloom and darkness of the Antarctic night. The monotony of

the gray Antarctic night, the lack of things to do and the general breakdown in health caused several of the men aboard the *Belgica* to lose their minds.

Although the *Belgica* was locked fast in the ice, the ship was moving with the pack, accompanied by giant icebergs. Navigators checked their changing position daily in this eerie moving sea of ice. They had figured that the *Belgica* and the pack ice were moving at a speed of from five to ten miles a day. The course on which they were drifting was zigzag, but generally in a westward direction.

The worst period for the explorers came in June, the height of the Antarctic winter. The rich foods which had been brought from home were causing an outbreak of scurvy, even though seal and penguin meat was eaten at almost every meal. Nearly all the men had the disease—some worse than others. Dr. Cook was tireless in his efforts to help his companions. Although he was unable to cure the victims, Dr. Cook managed to keep the sickness in check. Amundsen said that if it had not been for the patience and skill of the American doctor, a number of the men would have died.

Morale among the explorers sank very low. Commander Gerlache was a brave man personally but was unable to inspire his men to withstand their dreary ordeal. Matters were not helped with the death of Lieutenant Emile Danco, one of the chief physicists of the party. The strain of living under the terrible winter conditions was too much for his heart and the officer died suddenly on June 5. Burying the man was not easy. His companions had to chop a hole in thick ice and slip his weighted body through the opening.

On that same day, as though the explorers did not already have enough on their minds, a huge block of ice threatened to crush their ship. Unable to do anything about the slowly moving giant, they could only stand and await their fate. Just

when it seemed that the *Belgica* was to be ground into matchwood, the frozen bulk passed beneath the ship.

Somehow the trapped explorers lived through one monotonous day after another. Their spirits rose a little toward the end of July when the sun appeared once again. At this period of the Antarctic winter, summer in the Northern Hemisphere, the sun barely peeps over the horizon and then only for a brief time. This was a happy event for the disheartened members of the *Belgica*. On July 22, when the sun's arrival was expected, every man who could climbed the masts and shroud lines of the ship. The more energetic went out on the ice field and crawled to the tops of icebergs, hoping for a better view. Dr. Cook, writing about this dramatic moment, said, "Precisely at twelve o'clock a fiery cloud separated, disclosing a bit of the upper rim of the sun." Once more the frozen Antarctic was bathed in light and color.

Every member of the expedition was deeply moved by the vivid scene. "For several minutes," wrote Dr. Cook, "my companions did not speak. Indeed, we could not at that time have found words with which to express the buoyant feeling of relief. . . ."

Although the return of the sun was a signal that the long Antarctic winter was soon to be over, the trapped explorers still had to put up with a great many hardships and disappointments. As the Antarctic spring came on, they suffered some of their coldest days. The temperature at one time fell to a record-breaking —45.6 degrees Fahrenheit. Spring wore into summer and the patience of Commander Gerlache and his companions was almost at an end. At last clear water was sighted about a half mile from the ship. But there was still no sign of the ice cracking near the *Belgica*.

Realizing that time was growing short if they were ever to get free, the energetic Dr. Cook suggested to Gerlache that

rather than wait for the ice to thaw, which might not happen that season, a channel be cut to the open water. This was a big job but it was agreed to try it. The expedition was divided into work parties and soon the men were shoveling, chopping and sawing ice with great enthusiasm. It was back-breaking work, especially since the ice measured almost four feet in thickness. After more than three weeks of intense labor, a channel 2,000 feet long was cut to the open water. Freedom at last! The explorers planned to pull the *Belgica* to the open water lead on the day following the completion of the channel.

During the night, however, the unpredictable Antarctic weather froze the channel solid behind the ship. The next morning when the explorers saw what had happened to their hard-earned victory, they became utterly discouraged. They saw no hope of escaping their icy prison. However, nature suddenly decided to give them a helping hand. A stiff breeze sprang up and began to break up the ice in the channel. This time the *Belgica* pulled loose from her icy mooring and sailed to the open water. But the expedition was not yet completely free from danger. While trying to sail between two massive icebergs, the *Belgica* became jammed. Again it was an idea of the ingenious Dr. Cook's that helped the expedition on its perilous road to freedom. He suggested that penguin skins be draped over the sides of the ship to cushion the blows from the bergs. These floating mountains of ice were crunching the *Belgica* with every movement of the sea. The scheme worked and the explorers found themselves in ice-free water at last. With a feeling of great relief and happiness they headed north and on March 28, 1899, sailed into the tiny Chilean town of Puntas Arenas. This was the expedition's first contact with civilization after more than a year as prisoners in the Antarctic ice.

3

SIEGE OF THE SOUTH POLE

BY THE CLOSE of the 1800's the first phase of Antarctic exploration came to an end. Up to this time explorers had investigated only the fringe of the immense continent. They had been able to get a pretty good idea of its size and shape. Now, with the start of a new century, explorers were ready to find out what the interior of Antarctica itself was like. One of the first expeditions to undertake this task was sent out by Great Britain. Known officially as the British National Antarctic Expedition or, more popularly, the *Discovery* Expedition, after the ship used by the explorers, the party was commanded by Captain Robert Falcon Scott.

Well organized and equipped, Scott's group spent almost three years at the bottom of the world. The *Discovery*, which brought the explorers to Antarctica, was made as strong as it was then possible to build ships. The sides of the vessel were two feet thick, in order to take the crushing force of the pack ice. The bow of the *Discovery* was built up into a powerful battering ram with heavy log timbers and steel plates. The ship was powered by both sail and steam.

Captain Scott's companions were largely members of the British Navy. One of his officers was Ernest Shackleton, who in the not-too-distant future was to make South Pole history of his own. There were also two doctors in the group and three scientists. With the exception of three members, no one, including Captain Scott, had ever been to the Antarctic before. The leader of the expedition realized that this was a handicap. On his part, to make up the lack, he read the stories and journals of all the explorers who had, in years past, led expeditions to the south-polar zone.

The *Discovery* expedition left England on August 6, 1901, stopping briefly at Cape Town, South Africa, and Lyttelton, New Zealand, before heading toward its goal, Antarctica. Plunging through the wild south-polar seas, the *Discovery* looked like a floating market place. Every inch of space on the ship, below and above decks, was crowded with some item of equipment or supply. Tons of extra coal were heaped upon the deck, Eskimo dogs were chained in a crowded corner, while in another section more than forty sheep were penned up, a gift to the explorers from New Zealand farmers. On January 1, 1902, the explorers knew they were in the realm of the South Pole when they struck the pack ice that guards the approaches to Antarctica.

Captain Scott planned to head the *Discovery* in the same general area off the coast of Victoria Land which, more than fifty years before, had been explored by Admiral Sir James Clark Ross. Just as with his famous fellow countryman, Captain Scott and his party took only four days to plow through the pack ice. Once through this ice belt, the explorers sailed close to Cape Adare where a visit was made to the camp used by Borchgrevink. The British explorers left a message here for their relief ship which was to look for them the following year. The journey was continued farther south into McMurdo

Sound and then eastward along the face of the Ross Barrier.

While exploring the edge of the Barrier, Captain Scott pioneered a new method of travel in the Antarctic—balloon flight. Thus he beat by more than a quarter of a century modern-day visitors to the South Pole region and their use of aviation for exploration. A small bay had been found in the Barrier in which the *Discovery* was anchored. While some members of the expedition explored the top of this immense ice field with dog sled, Captain Scott unpacked an army observation balloon and made it ready for an ascension. The balloon rose slowly in the cold, clear Antarctic air while several of Scott's companions held onto the ropes dangling from the basket. Floating high above the Barrier, the explorer was able to see for miles in all directions. This was a historic event and the Captain knew it. But while swinging dizzily in the basket from the bottom of the gas bag, Scott was not so sure that he enjoyed the honor.

After this brief bit of exploration, the *Discovery* turned back to the west for McMurdo Sound. Not many miles to the southwest of Mt. Erebus, a location was chosen which seemed to offer a good winter anchorage. It was close to the Ross Ice Barrier. The explorers put up a hut on an extension of rock and ice. They called the site Hut Point. It was from this area that Captain Scott and his companions were to blaze one of the two main routes leading to the South Pole. Years later, Roald Amundsen found the other trail several hundred miles to the east, starting from the Bay of Whales.

It was the plan of the British expedition to allow the *Discovery* to be frozen in the ice and serve as their winter shelter. The building on Hut Point was to be used as a forward depot containing food and marching equipment for sled parties going on inland journeys next spring. During the several weeks before the arrival of the long Antarctic winter, members of

Scott's expedition spent long hours ashore learning how to drive sled dogs and travel on skis.

The training period was not easy. The ferocious dogs were especially hard to handle. It took a great deal of patience and many thrashings with the whip to make the animals respond to orders. More important, perhaps, than knowing how to use their equipment, was the respect which these inexperienced polar adventurers had to acquire for the brutal, killing ways of the Antarctic weather. Ignorance of the severity of Antarctic storms actually brought about the death of several dogs and one of the expedition members. The victim and several companions were out in the field with their dog teams when they were suddenly overtaken by a blizzard. Instead of camping, as an experienced polar traveler would have done, and waiting for the storm to end, Captain Scott's men set out for their base in the blinding snow. Unable to find the right trail, the unfortunate man and his dogs plunged over an ice cliff to their death.

Captain Scott worked as hard as his men in learning how to live and carry out scientific duties on the Antarctic Continent. He also shared in the triumphs and disappointments of his men during these weeks of training. At one time he and several others set out with a dog-sled team on a trip to the south which took several days. Captain Scott wanted to establish a depot of food which would be of help next season on his march to the South Pole. But they had to turn back because of storms and biting cold as well as trouble in handling the dogs.

The Antarctic winter with its sunless days put an end to all shore activities of the *Discovery* expedition. Now the men had to prepare for a new experience—how to live in close quarters through more than two months of continuous darkness. Captain Scott was an exceptional leader of men, and this quality

perhaps, more than any other, was why his government had picked him to lead the expedition to the Antarctic. Scott knew that keeping the men healthy and happy during the long, monotonous Antarctic night would be a difficult problem. When the time arrived, he had a program.

The men were kept busy changing and repairing the sleds and dog-team harnesses as a result of lessons learned during the shore training period. The living quarters aboard ship had to be kept tidy and clean, and this was a daily chore. The scientists held to a rigid schedule of gathering information through their various instruments—mostly about the wind and temperature. Sometimes variety was added to the winter routine with short marches on the ice field when the weather was clear. If they were lucky, the men brought back seals which were added to the food supply.

But life aboard the *Discovery* was not all work and no play. For amusement various members of the expedition would act out little plays. The explorers even had their own newspaper which was edited by Ernest Shackleton. Called the *South Polar Times*, almost everyone aboard ship sent bits of serious or funny news to the editor. Dr. Edward Wilson, who was a skillful artist as well as a brilliant scientist, made drawings for the paper. And so the Antarctic winter wore away for the *Discovery* expedition. Captain Scott and his men came through in high spirits and good health.

On August 22 the sun made its first full appearance above the horizon and put everyone in a holiday mood. The men scrambled to the highest points of jagged ice mounds to get a better view of Old Sol's return. Captain Scott was as much moved by the heavenly display as his men. Writing about the eventful day, he said: "For long our blinking eyes remained fixed on that golden ball and on the fiery track of its reflection; we seemed to bathe in that brilliant flood of light, and

from its flashing rays to drink in new life, new strength, and new hope. . . ."¹

Now that daylight hours were increasing, the expedition went about the serious business of preparing for the marches into the interior of Antarctica. The main goal of the summer trips, which Captain Scott planned to undertake himself, was to be the South Pole. He chose as his companions Ernest Shackleton and Dr. Edward Wilson. By the end of October, all preparations for the trip were completed. On November 2, 1902, with three sleds and nineteen dogs, the explorers set out across the Ross Barrier to the south for the great unknown. Their goal, the South Pole, was 731 miles away.

During the first few weeks, the explorers had an easy time of it. There were no really serious obstacles to traveling on the Barrier surface, except for sastrugi. Sastrugi are ridges of snow and ice blown into strange formations by the wind. By the end of November, however, they began to meet serious difficulties. The rich food on which they had feasted during the Antarctic winter was mainly responsible for their troubles. Scurvy broke out among all three explorers. Shackleton's condition was the most serious. His strength failed rapidly, and it was only with the greatest difficulty that he managed to keep up with the others. Shackleton's condition became so bad that Captain Scott relieved him of all camp duties in order to save his strength for marching.

Although less seriously ill than their companion, Captain Scott and Dr. Wilson also suffered painfully from the disease. The doctor checked the gums and legs of the victims daily. These were the most vulnerable places affected by scurvy. Swollen, angry-red gums and swollen ankles told the doctor how much headway the disease was making. The men began

¹ This and the following quotation are from *The Voyage of the Discovery*, John Murray, Ltd.

adding more and more seal meat to their diet. They had found it was a good antiscorbutic, like vitamin C, ordinarily obtained in fresh fruits and vegetables, and needed to prevent scurvy. For a time the seal meat helped, but then their supply ran low, and the disease came back more violently than ever.

To make matters worse, the dogs became ill and worn out physically from the long hard march. Several had to be destroyed. With less pulling power, food and camping equipment had to be stored along the trail from time to time. Despite the disappointing turn of affairs, Captain Scott was determined to get as far south as possible. By the end of December he realized that with a shortage of food, their bodies weakened by scurvy and the dogs almost at the end of their pulling power, the South Pole was beyond reach.

On December 30, after reaching latitude 82 degrees 16 minutes south, the explorers turned around for home. It was none too soon. Shackleton was so ill now that Captain Scott and Dr. Wilson began to despair for his life. All three were on such short food rations that they were constantly hungry. Indeed, they were so starved that in their sleep they had nothing but dreams of food. So many dogs had now been destroyed that Captain Scott and Dr. Wilson had to pull the heavy sleds. Shackleton was no help with this job.

The first problem on the homeward journey was to find the last food depot they had made. This was not easy on a snowy surface without any guiding landmarks. But luckily they spotted the food cache. With their strength and spirits renewed by a nourishing meal, the three explorers headed for their next goal, which they called Depot A. If Scott and his companions reached this, the danger of starving to death would be over.

Mile after mile the weary explorers plodded their painful way northward. Shackleton, barely able to stand, staggered on ahead. Captain Scott and Dr. Wilson followed, hauling the

heavy sleds. This was exhausting work over the bumpy, frozen surface. At last, with their strength almost completely drained, the adventurers reached the depot on January 28th. Captain Scott recorded this great moment in his journal. ". . . the last of the march was as near a rush as our tired legs could command . . . the one great and pressing evil will grip us no more . . . we started our search among the snow heaps with childish glee. One after another our treasures were brought forth: oil . . . biscuit . . . and finally, a large brown provision bag which we knew would contain more than food alone. . . . There are two tins of sardines, a large tin of marmalade, soup squares, pea soup, and many another delight that already make our mouths water. . . ."

As starving men would, the three explorers overate and in a little more than an hour became terribly ill from indigestion. After a most uncomfortable night, Captain Scott and his companions started on the last lap of their march. Within four days, weary and exhausted, the explorers staggered into the arms of their friends at the base who gave them a warm welcome. The men had been gone for ninety-three days and had marched, outward and back, a distance of almost 800 miles. Despite the length of their march, they had not gone beyond the storm-swept Ross Ice Barrier. They had traveled about halfway to the South Pole. But they had not yet reached the land portion of Antarctica.

When Captain Scott and his two companions stumbled into camp, more dead than alive, they saw that the relief ship *Morning* had found the base and was anchored near the *Discovery*. Fresh supplies and news from the outside world had been brought to the explorers. Since the *Discovery* had no wireless, Scott and his men had been cut off from home for more than a year. There was great excitement and joy among the news-starved explorers as they eagerly read letters and newspapers.

The second Antarctic winter was fast approaching, and since the *Discovery* was still solidly frozen in the ice, Captain Scott had little choice but to remain another year. Those who wished to go home on the *Morning* were given their chance. Shackleton, desperately ill, was among those who went aboard the relief ship for the trip back to England. He needed many months of medical care to regain his health. On March 2, 1903, the *Morning* pulled away from the base, leaving Scott and his men to face another long and lonely Antarctic winter.

Amazingly, Captain Scott and his companions came through their second Antarctic winter in better spirits and health. A large portion of their winter diet had been fresh seal and penguin meat and this, Scott believed, was the main reason for their fine physical condition. When spring arrived, he was happy to record that there was not a single sign of scurvy.

During his second summer on Antarctica, Scott added another long overland journey to his experiences. His goal was not the South Pole this time but a part of the frozen continent that lay to the southwest. Scott started out on October 12 with twelve companions and four heavily loaded sleds. This trek was even more difficult than the previous season's polar march. It took Scott and his men up the treacherous slopes of a glacier to a plateau 9,000 feet high. Since there were no more dogs left to pull the sleds, the men had to haul their food and equipment themselves, using a leather harness. This was grueling, exhausting work. It became even more painful on the high plateau where the thin air made breathing difficult.

Slowly the men crawled up the icy incline with their back-breaking loads. They bucked powerful winds that never stopped blowing and suffered painfully from the bitter cold. At one point they were immobilized for almost a week by a blinding blizzard. After about a month of this wearisome travel, the explorers reached the plateau. Scott then selected

two members of the expedition to accompany him farther while the others were sent back to the base.

Conditions were even worse at the top of the glacier. The winds and storms raged with greater fury while the cold was even more intense. It was not unusual for the thermometer to drop into the minus thirties. The barren unfriendly area of



Captain Robert Scott dressed for Antarctic weather.

Antarctica through which they were traveling was no help to their spirits. Scott wrote that it was “. . . a scene so wildly and awfully desolate that it cannot fail to impress one with gloomy thoughts.”

When a point about three hundred miles from the base camp was reached, the leader gave the word to turn back. The food stocks were getting dangerously low and the men were terribly tired. Although the explorers struggled against many difficulties, Scott was thankful that scurvy was not one of them this time.

During the final miles of their homeward march, Scott and his companions suffered starvation and were almost completely exhausted physically. To make matters worse, the men lost their way and were unable to find the trail down the glacier. They stumbled and slid down a long ice-covered slope, and by sheer good luck came upon the trail leading to the camp. By the end of December they were safely back with the rest of the expedition.

This second inland journey put an end to all such marches by Scott's party. There were not too many weeks left to the second Antarctic summer and everyone was now seriously thinking about getting the *Discovery* free from its icy trap. Many of the expedition members had had enough of exploration and longed to get home. About twenty miles from the *Discovery* there was open water and freedom. Rather than wait for the ice to crack loose around their ship, it was decided to saw a channel to the ice-free water. But cutting through the thick ice was a slow, difficult job. After considering the distance which the men had to saw and chop, Scott decided the task was too big and ordered it stopped.

Meanwhile, the British government had become worried over the Antarctic expedition and had sent two ships, the *Morning* and the *Terra Nova*, for their relief. The vessels

dropped anchor in open water some distance from the *Discovery* on January 5, 1904. Scott was handed new orders by the British Admiralty that if the *Discovery* could not be freed from the ice before another Antarctic winter arrived, the ship was to be abandoned and all the members brought back on the *Morning* and the *Terra Nova*.

Several weeks later, with the help of some dynamite blasts, the ice broke up around the *Discovery*. After three years of hardship at the southern end of the world, the British Antarctic Expedition was happily homeward bound.

Not long after Scott's visit to Antarctica, another polar expedition left England to explore the mysterious white continent and to reach the South Pole if possible. Surprisingly, the leader of this party of explorers was Ernest Henry Shackleton.

When Shackleton returned to England after suffering his physical collapse with Scott's expedition, his pride had been terribly hurt. It disturbed him deeply to think that he, normally a man of enormous vitality, should have been the weak link on the march to the Pole. Shackleton felt that he was responsible for Scott's failure to reach the South Pole. Shackleton made a vow that, once his health was regained, he would return to Antarctica to make up for his poor showing with Scott.

Five years after he walked off the ship *Morning* onto English soil, Shackleton had made a complete recovery from his attack of scurvy and was bounding about with his usual restless energy. He was ready now for a new Antarctic adventure, and he began it in 1907.

Shackleton planned his journey to Antarctica with great care and skill. He had learned much with Scott and now put this knowledge to good use. A small Newfoundland sealing ship was bought and almost completely rebuilt to cope with the rough Antarctic seas and ice. Shackleton christened the ship *Nimrod*.

He gave special attention to his food supplies. Shackleton wanted to make certain to provide his men not only with a nutritious and tasty diet but also with food that would prevent the outbreak of scurvy. He remembered all too well his own painful experience with this dreadful disease.

For overland transport on the journey to the South Pole, Shackleton took Manchurian ponies. These animals were accustomed to living in polar weather which often sweeps down upon their homeland from Siberia. They would, he believed, be easier to handle than the Eskimo dogs which Scott had tried to use. Shackleton's ponies were to be sent to New Zealand where the *Nimrod* would pick them up. At the last moment Shackleton changed his mind about polar dogs and took along nine Huskies in case something should happen to the ponies. He also decided to try a new kind of transportation for polar exploration, the automobile. This gasoline-powered vehicle was a new and exciting form of travel at the time Shackleton was organizing his expedition. But the automobile proved unsuccessful on the Antarctic continent. Its wheels stuck in the thick snow or spun uselessly on the ice.

By midsummer of 1907 Shackleton had finally gathered together his party of doctors, scientists and just plain adventurers. The last item of food, clothing and equipment was stowed aboard the *Nimrod*. On July 30, the expedition left London for the long voyage to New Zealand. This was the first lap of a journey which Shackleton hoped would lead successfully to the South Pole. If he could be the first explorer to reach the southernmost point of the world, that would be victory enough to wipe out the memory of his failure with Scott.

When the expedition reached New Zealand, the ponies, dogs and other last-minute supplies and equipment were put aboard the *Nimrod*. The vessel squatted deep in the water from its

heavy load. Indeed, there was not room enough aboard the ship for the extra supply of coal needed to sail the *Nimrod* to Shackleton's base on Antarctica and back again to New Zealand. So Shackleton made arrangements to have the *Nimrod* towed as far as the pack ice, a distance of some 1,500 miles. The *Koonya*, the first steel-hulled ship to sail over the Antarctic Circle, did the towing. After reaching the pack ice, the *Nimrod* pushed its own way through this obstacle.

When Shackleton had sailed with Scott along the Ross Ice Barrier, they found a small bay carved out of the icy, clifflike walls. The location seemed to offer a safe anchorage for ships as well as an easy way up to the top of the Barrier. Shackleton remembered this spot and headed for it. But the bay could not be found. Huge chunks of the Barrier had broken away and fallen into the sea, wiping out the little inlet since Shackleton's last visit. So he decided to head back to McMurdo Sound where Scott had found a winter anchorage. The explorer tried to reach Scott's Hut Point base but the ice blocked his way. Instead, Shackleton found a good location for his camp near Cape Royds. There was lots of solid rock here on which to build the huts.

The work of taking supplies and equipment off the *Nimrod* had its adventures. In fact, the expedition almost came to an end before it started. When the men led the ponies ashore from the *Nimrod*, the ice over which men and beasts were walking suddenly broke loose from the main field. The men pulled the ponies onto solid ice in the nick of time before the current carried them out to sea. The climax of Shackleton's troubles came when the *Nimrod* almost went down during a raging gale. Water poured over the sides of the ship and froze solid. This blocked the drainage holes in the deck so that the water could not run off. As a result, tons of ice formed on the *Nimrod* and soon the weight became so great that the ship

began to sink. The crew chopped at the ice furiously with their axes. Then they cut away sections of the rail to allow the water to run off. This saved the *Nimrod*.

Despite the many near disasters, Shackleton and his party of fourteen men finally got themselves organized on shore. Before the Antarctic night descended upon them, the explorers spent several busy weeks testing the ponies and their travel equipment for next spring's inland marches. Again there were some bad accidents. Four of the ponies died, three from eating sand on the exposed shoreline areas and one from eating poisoned food. After this serious loss the remaining ponies were closely watched and given great care. The success or failure of Shackleton's dash to the South Pole depended a great deal on these beasts.

The dark south-polar winter soon put an end to all outdoor activities and Shackleton and his companions retreated to their hut. Warm and snug in their snow-covered shelter, the explorers managed to keep busy through the winter. Cooking and cleaning the hut were daily chores that took up a good deal of time. Sleds and harnesses were checked and repaired, while the ponies and dogs had to be watered and fed. The scientists kept a day-by-day record of the temperature and force of the wind. For their amusement, the explorers published a newspaper which they called the *Aurora Australis*. Shackleton and his staff went over the plans for next summer's travels again and again so as not to omit one detail. Two major journeys were planned. Shackleton and three companions were to set off to the south in an effort to reach the Geographic South Pole. Professor Edgeworth David, the expedition's scientific leader, together with two other members, was to make an attempt to reach the South Magnetic Pole, which lay far north of the camp.

The ends of the geographic polar axis and magnetic polar



Library of Congress

axis do not terminate at the same point on the earth. This is so because the axis of the magnetic poles is at an angle to the axis of the geographic poles. Thus the North Magnetic Pole is south of the Geographic North Pole while the South Magnetic Pole is north of the Geographic South Pole.

With the coming of spring and the return of the sun, Shackleton and his fellow explorers lost little time in getting ready for the polar dash. One of the first things they did was to set up a food depot 100 miles south of their camp. This was in preparation for the explorers return march from the South Pole. By October 29, everything was ready and Shackleton, Lieutenant J. B. Adams, Dr. Eric Marshall and Frank Wild started out. Each of the explorers led a pony pulling a heavily loaded sled. According to the calculations of the explorers, they should be able to get to the Pole and back to camp in about ninety-two days. Their plan was to try to march about nineteen miles a day. Enough food was taken along so that each man would have a daily ration of thirty-four ounces and the ponies would have ten pounds of dried corn a day.

By November 26, the explorers had gone beyond Scott's farthest southern point, but this success had not been easily won. The route over which the men had traveled was dangerous and a torture to tired muscles. Sastrugi, the frozen ridges of snow, made sled hauling painfully slow. At other times the men sank to their knees in long stretches of soft, deep snow. Deep crevasses crisscrossed their trail. Crevasses are cracks in the snow or ice, sometimes inches or even many feet in width, and often bottomless. Usually the tops of the crevasses are covered by snow, making it difficult to see the openings. Sometimes a snow bridge, as the snow covering is called, is strong enough to hold the weight of a man or animal crossing it. A weak bridge will collapse unexpectedly, dropping the victim into a dark, ice-walled canyon. Few words were spoken by the explorers as they trudged through this lifeless white world.

Although the explorers wore heavy woolen underwear, two woolen shirts and trousers and an outer garment made of waterproof material, called Burberry, bone-chilling cold con-

tinued to plague them. Shackleton and his companions were hardly out of their sleeping bags before their Burberrys froze as stiff as a suit of armor. Even their tough fur boots, copied after the finnesko footgear worn by the Laplanders, were beginning to wear out. Blizzards and snow blindness were other problems the men had to struggle against day after day. The most serious handicap of all, however, was hunger. They were not on the trail very long before Shackleton realized that their rations were too small for the amount of physical work they were doing. They would have to eat more if they were to have the necessary strength to reach the South Pole.

An unexpected but welcome addition to the explorers' rations was made in the form of pony meat. After a little more than two weeks of pulling heavy sleds over rough ice and deep snow, the ponies began to show signs of wearing out. On the nineteenth of November Shackleton and his men were forced to kill the most exhausted of the poor beasts. The animal was butchered and some of its meat was eaten immediately. Then part of the remaining pony meat was put aboard the sleds and part was placed in storage along the trail for use on the return march. The below-zero temperatures froze the meat solid and preserved it.

Their principal food was pemmican, the old standby of polar explorers. Pemmican is a mixture of dried beef, fat, sugar and raisins. The preparation is usually canned. Shackleton had the ingredients of his pemmican mixed in special proportions which he hoped would prevent scurvy. Other foods carried by the explorers included biscuits, cheese, tea and cocoa. But pemmican was the main food at all meals. It was most often cooked as a stew, with pieces of biscuit added for variety. It did not take long for the men to become thoroughly tired of this monotonous diet. The explorers usually ended their meals with tea or cocoa. They melted snow for the water. All cooking

was done on a small alcohol-burning stove that they carried.

The explorers liked a soup made from the pony meat rather than the flesh itself. Shackleton wrote in his journal that, ". . . the meat and blood, when boiled up, made a delightful broth, while the fragments of meat sunk to the bottom of the pot. The liquor was much the better part of the dish, and no one had much relish for the little dice of tough and stringy meat, so the cook had to be very careful indeed."² Thereafter, pony meat made up a good portion of the explorers' diet, although near the end of their march rations were at the starvation level. Shackleton later believed it was the pony meat rather than his pemmican that kept them free of scurvy.

Cooking, eating and sleeping took place inside two tents which the men set up at the end of each day's march. The tents were flimsy but welcome shelters which gave a few hours of relief from the blinding white scene. The tents also provided some protection from the ceaseless wind while the explorers rested in their sleeping bags.

Finally, the two remaining ponies were slaughtered for food. The last, called Socks, fell to his death down a deep crevasse. This accident almost forced Shackleton to return to his camp. The sled which Socks was pulling held more than half of the explorers' equipment, plus much food. Luckily, the harness broke as Socks plunged downward leaving the sled jammed in the opening of the crevasse. Frank Wild, who was guiding the pony at the time, narrowly escaped death. He had fallen through the opening but managed to cling to the edge of the crevasse. His cries for help brought his companions on the run and they hauled him up to safety.

Having the pony meat for food helped the explorers solve part of their difficulties, but now the men had to haul the

² This and the following quotations are from *The Heart of the Antarctic*, J. B. Lippincott Company.

cumbersome sleds themselves. This put an added strain on the fast-disappearing strength of the explorers, especially when their route led over mountainous terrain.

Almost since the start of the polar march, Shackleton and his companions had been trudging in a southeasterly direction. By the first part of December they realized that they were moving away from the South Pole. So the explorers swung to the right and soon found themselves up against range after range of towering, snow-capped mountains. Shackleton's path to the South Pole was now blocked unless a passageway between the rugged peaks, many of them over 14,000 feet high, could be found. A few days of marching alongside one of these mountain ranges and the explorers discovered what they were looking for—a long, sloping incline that led up between the peaks.

The passageway which Shackleton and his companions found was a glacier which, while level enough, was criss-crossed with countless numbers of deadly crevasses. It was in one of these ice canyons that the explorers lost Socks. Shackleton called the glacier Beardmore, in honor of one of his generous financial supporters. This treacherous river of ice was one of the first gateways discovered leading to the South Pole.

Climbing the Beardmore Glacier was slow, hard work. The men used many tricks of the mountain-climbers' art to get their heavy sleds over the crevasses. Much precious time and distance were lost since the explorers were really climbing upward rather than toward the Pole. In a little less than two weeks, the four explorers had reached a height of 5,600 feet but had progressed only fifteen miles in the direction of their goal. Completely occupied with the problems of the march as they were, they managed to keep their eyes open for unusual sights. As they neared the top of the glacier route, the explorers found exposed layers of coal on the mountain slopes.

Christmas Day saw Shackleton and his three comrades almost at the summit of the glacier. Isolated in a frozen world miles from their friends at the base camp, the explorers did not permit the holiday to go by without some celebration. After eating their usual "hoosh"—a stewlike food made from pony meat and pemmican—plum pudding was served. The explorers then enjoyed cigars, brandy and crème de menthe, delicacies which had been brought along just for the holiday. Huddled in their small tent, the party was as relaxed and comfortable as they had not been for days.

While resting at their Christmas camp, the explorers took stock of their progress up to that point. They had been fifty-seven days on the trail and were now something like 280 miles from the South Pole. This meant that lots of difficult marching still lay ahead. If they failed to reach their goal, a shortage of food would be the main cause. Sufficient rations became more of a problem as the explorers resumed their march. The day after Christmas, Shackleton wrote: "Two more days and our maize will be finished. Then our hooshes will be more woefully thin than ever. . . ." At last, on December 27th, Shackleton and his party reached the Polar Plateau, an immense, rather flat region of snow and ice on which the South Pole is located.

If Shackleton thought they would have an easier time of marching now that they were off the glacier, he quickly found out otherwise. The Polar Plateau is almost two miles above sea level and at this height there is less oxygen than at the lower levels. The explorers discovered that the thin air in which they marched made breathing difficult and caused them to suffer painful headaches and nose bleeds.

On December 31, 1908, the first faint doubts began to enter Shackleton's mind that perhaps they would not be able to make the South Pole after all. Resting in camp that evening,

the British explorer wrote: "We are in latitude 86 degrees 54 minutes south tonight, but we have only three weeks' food and two weeks' biscuit to do nearly 500 geographical miles. We can only do our best." If they succeeded in getting within sixty miles of the South Pole, the plan was to put the bulk of their equipment in a depot and, with only a single tent and some food, make a dash for their objective. Shackleton had hoped to be at the Pole on January 12, then make a fast march home so that they would be back by February 28th. This would give them plenty of time to catch the *Nimrod* which by then was expected back from New Zealand.

During the first days of January, the explorers were suffering terrible physical tortures. Shackleton wrote: "We are so tired after each hour's pulling that we throw ourselves on our backs for a three minutes' spell. . . ." By this time they had dropped off great quantities of their equipment so that each man was only pulling seventy pounds instead of the 250 pounds they had been hauling three weeks before. But pulling the lighter sleds seemed to be even harder work than hauling the heavier ones. This was a clear sign to Shackleton that they were all becoming dangerously weak. Instruments told the explorers they were now marching at an altitude of 11,200 feet, and to add to the misery of altitude-sickness was the ever-blowing wind. This unseen enemy tore through the men's worn clothing and blew frozen snow against their faces cutting them cruelly. Frostbite stung the hands and feet.

On January 6, Shackleton and his three companions agreed that they had reached the limits of their strength. The South Pole was beyond their reach. They decided to leave their camping equipment behind and, carrying only food, to march south as far as possible and plant the British flag. But for the next two days the explorers were trapped in their small tent by a furious blizzard.

At last the storm let up on January 9th. The explorers crawled out of their sleeping bags at two o'clock that morning, had breakfast and by four o'clock marched southward with the flag that had been given them by England's Queen Alexandra. Sadly, Shackleton wrote in his journal: "Our last day outward. We have shot our bolt, and the tale is latitude 88 degrees 23 minutes south, longitude 162 degrees east." The South Pole lay ninety-seven miles beyond their tortured, starved bodies. At this latitude the staff of the Queen's Union Jack was planted in the snow and the plateau claimed for Great Britain. A brass tube filled with stamps and documents was also placed at the spot.

"While the Union Jack blew out stiffly in the icy gale that cut us to the bone, we looked south with our powerful glasses, but could see nothing but the dead-white snow plain. There was no break in the plateau as it extended toward the Pole, and we feel sure that the goal we have failed to reach lies on this plain. We stayed only a few minutes, and then, taking the Queen's flag, and eating our scanty meal as we went, we hurried back and reached our camp about 3 P.M." Thus Shackleton wrote of their last day on the unsuccessful southward journey to the Pole.

The weary, disappointed explorers now began the march back to their base camp to meet the *Nimrod*. Their homeward march was only a little less cruel than the journey toward the Pole. They were still cold, weak and hungry. Their biggest worry was whether they would be able to find the food depots which they had set up on the outward march. If they missed them on the desert-like plateau, then the explorers would have a poor chance, indeed, of reaching camp alive. But good luck was with them because they were able to follow the tracks they had made weeks before to most of the stored food.

Shackleton and his men had several other things in their

favor as they tramped homeward. The route was downward now and the wind, for the most part, blew against their backs. Thus they were given some assistance by nature, especially when they rigged sails on the sleds. As the wind tugged at the sails it made the job of pulling much easier. During the final days of February the weary explorers neared their goal—and just in time. On the twenty-third of February they reached their last food depot where they were able to get much-needed nourishment. The men were now less than a week from their camp. Dr. Marshall at this point was so weak that Shackleton decided to leave him at the depot with Adams while he and Wild made a dash for camp to get help.

On the twenty-eighth of February the two explorers, after an absence of 117 days, stumbled into their base camp—only to find it deserted. A letter addressed to Shackleton was found in the hut. The message explained that the *Nimrod* had arrived and, after taking aboard the expedition members, would wait at Glacier Point until February 26th at the latest for Shackleton and his companions. The ship would have to leave after that day because of the rapid freezing of the pack ice. Two days beyond that deadline had already gone by and with sinking hearts the two explorers had visions of spending another dreary winter on Antarctica.

In the desperate hope that the *Nimrod* might not be too far away, Shackleton and Wild dashed to a nearby hill and searched the ice-choked area. Suddenly they both let out a shout of joy as the *Nimrod* was seen some miles offshore. Using a mirror to reflect the sun's rays, the explorers flashed a code message to their vanishing comrades. Fortunately, look-outs aboard the vessel spotted the brilliant flashes of light and the *Nimrod* returned for the stranded leader and his companions. A rescue party led by Shackleton was quickly organized and brought in Dr. Marshall and Adams. With all

hands present once again, Shackleton and his loyal crew lost little time getting the *Nimrod* out of the pack ice before the winter temperatures froze it solid.

Often during his own tortuous march toward the Pole, Shackleton had thought of Professor David and his two companions and wondered if they were meeting with similar difficulties. Now, on the long sea-voyage home, he heard in detail the adventures of the Magnetic Pole party.

This group of explorers, made up of Professor Edgeworth David, the expedition's chief geologist, Douglas Mawson, and another companion, had left camp on October 9, a little more than three weeks before Shackleton's departure. Since Shackleton's party was to use the ponies, the Magnetic Pole explorers had to man-haul their own sleds. They were forced to climb treacherous glaciers, crawl over ice and plow through deep snow in order to reach their goal, some seven hundred miles north of the camp. The South Magnetic Pole is not a stationary point but moves about over a rather large area. This is due to the magnetic forces that play upon the earth in this region. Because of its elusiveness, the Magnetic Pole was not an easy target to find.

Three and a half months after leaving their base the explorers found themselves on a plateau seven thousand feet high. On January 18, 1909, following a short march in this comparatively level region, the dip needle of their magnetic compass pointed straight down. This was the sign to the men that they had found the moving Magnetic Pole. Professor David and his two companions figured the exact location to be latitude 72 degrees 25 minutes south, longitude 155 degrees 16 minutes east. They next unfurled the Union Jack and took possession of the surrounding frozen land for England. Their business finished, the explorers began the homeward trek. They did not go back over the same route but marched in-

stead toward the seacoast not too far away. According to a prearranged plan, they were to meet the *Nimrod* at a point where the Drygalski Glacier entered the sea. This they did on February 4th. The journey of Professor David and his companions had taken 122 days and covered a distance of more than 1,200 miles.

The achievement of the Magnetic Pole party did much to soften Shackleton's own disappointment in failing to reach the Geographic South Pole. Although this main objective of the expedition had remained beyond his grasp, the veteran explorer believed that his Antarctic venture had accomplished much that was worth while. His own sled journey toward the Pole had been the greatest of any Antarctic explorer up to that time. Discovering the South Magnetic Pole, of course, was another highlight among the expedition's accomplishments. In addition to these, much new information had been gathered about the size of the Ross Shelf Ice; the first practical route up to the Polar Plateau had been found in the form of the massive Beardmore Glacier; Mt. Erebus, the 13,000-foot volcano, had been scaled for the first time and, finally, several towering mountain ranges were discovered and charted.

When Shackleton and his men set foot on their beloved England once again in the summer of 1909, they were greeted warmly and showered with many honors. The leader himself was knighted and thereafter became Sir Ernest Shackleton. After the tumult and the seemingly endless round of receptions, Shackleton retired to his home to write of his adventures on Antarctica. In the quiet of his study the explorer reflected on the reasons for his failure to reach the South Pole and finally settled on two which appeared to stand out above all others.

The first of these was his inability to use Hut Point as a main base. Ice had blocked his way. This location would have

brought Shackleton 100 miles closer to the Pole. The second stroke of bad luck was the loss of the pony, Socks. If the explorer and his companions had been able to add this pony's meat to their rations, there would have been enough food to get to the South Pole and back. Shackleton was convinced that the accident to Socks by itself spelled the difference between success and failure.

Shackleton's Antarctic adventure had aroused much interest among other explorers, especially those who were planning expeditions of their own to the south-polar continent. These gentlemen gained much valuable knowledge from Shackleton's experiences. Not the least was information about the first practical route—the Beardmore Glacier—to the top of the Polar Plateau on which the South Pole is located. With careful preparation and luck, these explorers were confident that they would now succeed where the courageous Shackleton had failed.

4

AMUNDSEN— POLAR VICTOR

THE YEAR 1909 was an exciting one for news of polar explorations. Shackleton's expedition had returned to England and received a rousing welcome. Captain Robert Scott was deep in plans for a second journey to Antarctica. In Norway a famous explorer of the Arctic regions, Roald Amundsen, was also busy with preparations for an expedition to the North Pole. Then one day the newspapers announced the most dramatic news of all. The North Pole had been discovered! After many trials and failures by a number of explorers, an American naval officer, Admiral Robert E. Peary, had finally reached the top of the world. To one explorer at least, Roald Amundsen, this news came as a shock.

Ever since he was a little boy, Amundsen had his mind set on being an explorer. He had spent many years at sea and living in the Arctic regions preparing himself for his life's work as an explorer. The Norwegian had even made a trip to the Antarctic aboard the *Belgica* and suffered the hardships of a south-polar winter while the ship was frozen in the ice. His biggest ambition was that someday he would be the first to reach the North Pole. Now Admiral Peary had put an end

to that dream. Since there was no longer any reason for going to the North Pole, Amundsen wondered what to do with the expedition he had just organized.

Much money had been collected and spent to buy a ship, supplies and equipment. All this would be lost unless he could think of some other exploration venture. Amundsen finally decided to go to the Arctic region anyway. He would head for the Bering Strait area and carry out scientific and exploration work there. At least, that is what he announced to the public. Secretly, Amundsen had made up his mind to go to the opposite end of the world, Antarctica, and search for the South Pole. With the exception of three of the officers, the crew aboard the explorer's ship thought they had signed on for a trip to the Arctic. Only when the expedition reached the Madeira Islands, did Amundsen tell them his real plans. Those who wished to were given the chance at this point of either returning or continuing with the expedition. Amundsen wasn't quite prepared for the enthusiastic response he received. Not a man wished to leave the ship. They were all eager for adventure in mysterious Antarctica.

Amundsen had trained well for the life of an explorer in the polar regions. He had lived among the Eskimos and Laplanders for many months, studying their manner of dress and the foods they ate in order to survive in their cold climate. His experiences among the Eskimos had been especially valuable since he learned how to handle and care for the Husky dogs which those northern people use for transportation. Amundsen had also studied the journals of other polar explorers and made notes of the lessons which the experiences of these adventurers had to offer. He had become an expert on Arctic living and traveling. He believed that the same kinds of food and equipment needed to survive in the north-polar regions could also be used for exploring on Antarctica.

One of the main reasons why Amundsen was so successful as an explorer was the great care he took in organizing his expeditions. The smallest detail of food, clothing and equipment was given his closest attention. Thus, when his expedition left Norway for the great south-polar adventure, it was probably the best prepared of any that had visited that part of the world up to Amundsen's time.

To carry his expedition to Antarctica, Amundsen bought a sturdy little ship that had seen many days of sailing in Arctic waters. This was the *Fram*, a three-masted sailing vessel which Amundsen had rebuilt for the South Pole trip. It was made extra strong in the hull, especially at the bow which would be taking powerful blows when the ship crunched its way through ice fields. The ship's old steam engine was replaced by a Diesel engine which gave the *Fram* a little more auxiliary power. The name *Fram* which Amundsen selected for his ship is a Norwegian term meaning "forward" or "through." This was really a one-word motto, and it expressed the explorer's feelings about every adventure he undertook.

Amundsen chose dogs for his transportation on Antarctica. He did not share Captain Scott's opinion that Husky dogs were unsuited for working in the Antarctic. He had watched the Eskimos use these animals with great skill in the Arctic. Amundsen himself had learned to value them on his own travels through the northland. If further proof of their value was needed, Huskies had pulled Admiral Peary across the Arctic wastelands to the North Pole. There was no reason, Amundsen felt, why Huskies should not prove equally helpful in the Antarctic where similar snow and ice conditions prevailed. Amundsen believed that Scott did not know how to feed, train or handle the dogs.

Scott preferred Manchurian ponies. But the Norwegian explorer did not think these beasts could compare with Huskies.



K. Harstad, Oslo

The dogs were much lighter in weight. If they stepped on a weak snow bridge over a crevasse, it would be less likely to collapse under the weight of the dogs. However, even if the dogs did plunge into a crevasse, it would be much easier to haul them out. Ponies were unable to climb steep, slippery glaciers, while the lighter, more sure-footed Huskies could. This was another important advantage to Amundsen's mind. He did not like the idea of man-hauling heavily laden sleds, as Scott and Shackleton had done. This sort of labor sapped too much strength from a man. When the *Fram* left Norway, 100 of the finest Greenland Huskies that could be bought were chained to the boat's deck.

The only worry Amundsen had about his dogs was to get them through the tropical climate in good health on the way to Antarctica. The explorer overcame this problem successfully. When the *Fram* finally docked at the side of the Ross Barrier, the dogs were actually in better health than at the start of the long sea voyage. Indeed, their number had even been increased by sixteen little puppies.

When Admiral Peary forced Amundsen to change his plans and go to the South Pole, the Norwegian explorer knew that Captain Scott was also making preparations for a journey to the Antarctic. Now it appeared that there was going to be a race to the southern end of the world, although Scott did not know this yet. Amundsen felt a little uneasy about racing the Englishman to the South Pole, especially after publicly saying that he was headed for the Arctic. His sportsmanlike feelings told Amundsen that some word must be sent to Scott before a possible meeting on Antarctica. Just before leaving the Madeira Islands, he instructed his brother to send a message of his new intentions to Scott at Melbourne, Australia. When the English explorer arrived at the Australian city, he was startled to receive the Norwegian's cablegram: "Am going south—Amundsen."

After pulling up anchor at Madeira, Amundsen's ship had a long, slow sail to the south-polar regions. The *Fram* was a better boat for sturdiness than speed. Although the Norwegians met a few storms, the boat took these easily and the pack ice was reached without any exciting adventures. Even this first Antarctic barrier was no obstacle, because the *Fram* pushed its way through in four days. Once in the Ross Sea, Amundsen headed for the Bay of Whales, a large indentation in the Ross Barrier. He had made a close study of charts and reports of other explorers of this area and decided that here was the best place for his main base. Shackleton had visited

this region three years before but did not use it for a camp because of the danger of the Barrier crumbling. Amundsen believed that if he got far enough inland from the edge of the Barrier, there would be little to fear from massive chunks of ice breaking free.

The *Fram* was tied up alongside a low ledge of the Barrier which made unloading easy. By the middle of January, 1911, most of the supplies and equipment had been brought ashore and carted to a good camp site about two miles from the edge of the Barrier. The dogs were used to pull the sleds from the ship to the camp. The animals were so happy to leave the ship and to be on snow again that they became unmanageable. They played and battled among themselves and paid little attention to the commands of the explorers. When put into harness and hooked to the sleds, the Huskies would dash off in the wrong directions. The drivers would shout and crack their whips in a vain effort to bring the animals under control. Sleds would topple over on these wild rides, often spilling the drivers and contents. There were other times when the dogs would get it into their heads to squat down and not budge an inch, no matter how loud the drivers halloed or how fiercely the whip whistled through the air. But with much patience and wise use of the whip the dogs, in time, were brought under complete control and proved to be more valuable than the explorer had dared to hope.

Amundsen had made an excellent choice with his camp location. His base proved to be sixty miles closer to the South Pole—about 800 miles away—than Captain Scott's. Scott had set up his camp on the western edge of the Ross Sea, more than 350 miles from the Norwegians. As matters turned out later, Amundsen's location also proved to be far less stormy than Scott's. Thus, when Amundsen began his dash to the Pole he had the advantage in distance and weather.

Just as soon as work on their winter hut had progressed to the point where some of the expedition members could be spared for other tasks, Amundsen started on southward journeys to establish three main food depots for the next summer's polar trek. He wished to take full advantage of the few remaining weeks of good weather before the Antarctic's dark winter arrived. There would be no time to set up these depots next season, and they were important. Amundsen and his companions would need the food for the return trip from the Pole when their supplies would have run low and, possibly, even exhausted. The depots really meant the difference between living or dying on barren Antarctica. Tin and wood boxes filled with pemmican, chocolate, dried-milk powder, biscuits, and dried fish for the dogs, were to be stored in the depots. The cases of food were stacked one upon another and then fenced in with blocks of snow which the explorers cut out with their knives and shovels. Small flags attached to wooden poles were jammed into the depots to serve as markers.

By the middle of February the leader of the Norwegian expedition was ready to start on the first depot-laying journey. This food cache was to be established on latitude 80 degrees, a little more than 100 miles from camp. Four men, including Amundsen, three sleds and eighteen dogs went on this first inland trip. The sleds were heavily loaded and it took the dogs four days of hard pulling to reach the goal.

Two other food depots were set up on the more distant latitudes of 81 and 82 degrees. The explorers carried out these marches under cruel weather conditions and as a result Amundsen lost two of the three dog teams which he used on this journey.

The top of the Ross Ice Barrier over which Amundsen and his companions made their depot-laying journeys is quite level, with no outstanding objects to use as guides. The white

surface of snow is much like a frozen desert stretching in all directions for miles upon miles. It is very difficult for anyone traveling over this snowy wasteland to keep in a desired direction. Writing later about this peculiar problem of Antarctica, Amundsen said: "It is no easy matter to go straight on a surface without landmarks. Imagine an immense plain that you have to cross in thick fog; it is dead calm, and the snow lies evenly, without drifts. What would you do? An Eskimo can manage it, but none of us." In order to find their way to the depots the next summer, the Norwegian explorers marked the trail with bamboo poles. When they ran out of poles, the men jabbed into the snow dried fish which had been brought along as food for the dogs.

By mid-April, as the long Antarctic night began, the depot-laying work was finished. The explorers now turned to duties inside their hut until the sun returned once again. The men had plenty of work to keep them busy. A great deal of time was spent making their camp—which they called Framheim—more livable. They tunneled into the deep snow and carved out work rooms and storage rooms. These were connected to the main wooden hut by snow-covered passageways so that it was not necessary for the explorers to go outdoors to reach the various rooms. When the raging winter blizzards and huge snowdrifts covered Framheim completely, the shelter became a cozy place in which to live. Throughout the winter months, the temperature inside the hut was kept at a comfortable 68 degrees Fahrenheit.

The explorers spent most of their time changing and repairing their field equipment. The depot-laying trips had showed Amundsen that their sleds and clothing were not as good as they could be. The sleds, for one, were found to be much too heavy. Weeks were spent during the winter taking the sleds apart and rebuilding them. Some parts were left out while

other wooden portions were shaved down to thinner layers. Bjaaland, who was in charge of this particular job, proved to be an expert. He cut the weight of the sleds from 165 pounds to forty-eight pounds without weakening them.

The explorers gave special attention to their outdoor clothing. The men's garments were made from reindeer skins. While living among the Eskimos, Amundsen had learned that this material was probably the best for keeping a man warm and dry in polar climates. Reindeer clothing was also wind-proof, which was very important on Antarctica where gales are a common occurrence. Another important advantage was its light weight and the freedom of movement which it gave to the wearer. Other kinds of polar clothes when wet or coated with ice became unbearably heavy.

The boots which Amundsen and his companions were to wear on next summer's march were cut apart and remade. The footgear brought from Norway had turned out to be too small and uncomfortable, in Amundsen's opinion. If there was any interference with the circulation of the blood, then the feet would be more susceptible to frostbite. The boots had to be enlarged. This job had to be done carefully and the boots made to fit a man's feet comfortably.

The packing crates in which supplies were to be carried on the polar trek were taken apart and also made lighter. The short summer journeys inland had proved that white tents were unsatisfactory because it was hard to see them against a background of snow. The white also reflected the sun's heat instead of absorbing it, thus keeping the inside of the tents cool. The explorers wanted warmth after tramping for hours in the cold. So red curtains, which had been brought along for decorating the inside of the hut, were sewn onto the tents.

Hours were spent working on skis, ski poles, the harnesses for the dog teams and even the dog whips. The whips were

an important tool in the hands of the drivers for keeping the half-wild dogs under control. Frequently the beasts would break out in savage, bloody fights. A cracking whip was the only way the men could safely stop the ferocious squabbles. The whips were not strong enough and felt too heavy for some of the drivers, so lighter and sturdier ones were made. Not a single piece of equipment which was to be used or taken along on the South Pole journey was overlooked during the winter's work program. This careful preparation was Amundsen's way of reducing risks when about to start out on dangerous ventures.

In addition to looking after their equipment and supplies during the long Antarctic night, the explorers also kept a constant check on wind velocity and temperature. The lowest temperature they recorded for the winter was minus 74 degrees. They were fascinated by and studied the vivid night-sky display of aurora australis. These are bright, many-colored bands of light that flash across the south-polar heavens. The same sky show takes place in the arctic region, where it is called aurora borealis.

Besides the work of preparing the marching equipment, the explorers also had their regular daily jobs of cooking and keeping their quarters tidy. But there were many moments of fun too, when the men played games, sang or just relaxed with a good pipe and exchanged light-hearted talk. Thus the Antarctic night, twenty-four hours long, passed by day after day. On August 24, the sun appeared. Amundsen and his companions were glad that their long imprisonment was over. But they had come through the ordeal ". . . healthy in mind and body." They were all anxious now to start out for the South Pole. They were too anxious—as matters turned out.

As the Antarctic spring approached, it brought unusually mild temperatures. Amundsen thought the weather was good

enough to begin the southern journey. So on September 8 he started out with his party of eight men, seven sleds and ninety dogs. They carried enough supplies to last ninety days. But the explorers were not on the trail many days before the temperature took a surprising and uncomfortable plunge. They recorded dips as low as minus 58 and 75 degrees. While the explorers did not feel too uncomfortable, it became too much for the dogs. The immense strain of hauling the sleds in the bitter cold weakened the animals rapidly.

The party got as far as the first food depot on latitude 80 degrees, when Amundsen decided that they had begun their dash too early and ordered a return to their base. Some of the supplies which they had brought along were left at the depot and then the dogs were turned about and headed north. Once back at Framheim, Amundsen waited until the warmer weather was sure to stay. A positive sign that the Antarctic winter had gone for good was the return of the seals and skua gulls to the Barrier.

While waiting at Framheim for better weather, Amundsen realized that his polar group had been too big. It was hard keeping together on the trail, and the large number of men and dogs caused much loss of time in making and breaking camp. He decided that only five men, with four sleds and fifty-two dogs, would make the trip to the Pole. Three expedition members were sent on an exploration mission to King Edward VII Land which lay to the east of Framheim. The cook was the only man of Amundsen's expedition who was to remain in camp and look after things until the explorers got back.

On October 20, 1911, Amundsen, together with Olav Bjaaland, Sverre Hassel, Oscar Wisting and Helmer Hanssen, set out for a second time to reach the South Pole, latitude 90 degrees south. The weather gave them a kind send-off. It was

mild and sunny, and the explorers hoped it was a good omen.

During the first four days Amundsen and his comrades made excellent time over the level Barrier surface. The dogs were strong and eager to pull, and the 100-odd miles to the first depot were easily covered. The animals were rested two days at this point, although their excellent condition made the stop unnecessary. But the men depended upon the dogs to get them to their goal and back so they were given very special care.

When they left this first depot, Amundsen decided that he would take over the position of forerunner. This man had to break the trail and keep everyone headed in the proper direction. The leader of the group hadn't gone very far before he discovered that the over-eager dogs were coming up behind him too fast and getting tangled in his skis. This slowed the party a good deal, and Amundsen, of course, did not like to see this happen. So he gave up his front-running position and let the lead dogs break trail, running as fast as they wished. The driver of the lead sled now had the job of keeping the dogs headed in the right direction, thus acting as guide for the whole party.

Amundsen, meanwhile, tied a rope to the back of a sled and, holding on to one end, allowed himself to be pulled on skis over the frozen surface. "And there I stood," Amundsen wrote in his journal, "until we reached 85 degrees 5 minutes south—340 miles. Yes, that was a pleasant surprise. We had never dreamed of driving on skis to the Pole!" But the entire journey was by no means as easy as this. Once they reached the end of the Ross Ice Barrier, which took about three weeks, their difficulties really began. Their way was barred by range after range of incredibly high mountains. These had to be crossed to get to the top of the Polar Plateau, which Shackleton had discovered and on which the South Pole is situated. They had

to find a pass that would permit them to climb up peaks that easily towered 12,000 to 15,000 feet into the sky. The Polar Plateau itself lay more than 10,000 feet above them.

An immense river of ice was sighted curving downward between tall mountain peaks. The Norwegians called it the Axel Heiberg Glacier. It seemed to be the road, treacherous, the men were sure, that would lead them to the Polar Plateau. Before starting up this long, dangerous passageway, Amundsen and his companions decided to leave some of their food and equipment in a depot at the foot of the glacier. Their chances of making the climb successfully would be better if they traveled as light as possible. They agreed that food enough for about two months ought to be ample to see them to the Pole—about 500 miles away.

Climbing the Heiberg Glacier was probably the most difficult part of Amundsen's journey to the South Pole. Numerous crevasses had to be crossed, and this was not easy with a pack of wildly scrambling dogs and heavily loaded sleds. Sometimes these openings in the glacier surface were so big that roundabout detours had to be made. Above all, the surface was no longer level, but sloped upward at a steep angle. This forced the dogs to strain twice as hard against their harness as they pulled the sleds. Sometimes two teams had to be hitched together to pull a sled up an especially steep slope. The dogs performed beautifully, and Amundsen had nothing but praise for the animals.

One of the strangest things Amundsen and his companions complained of as they worked their way up the Heiberg Glacier was the heat. While struggling with unruly dogs and cumbersome sleds up the steep slopes, the explorers actually became uncomfortably warm. They were forced to take off many of their outer garments but the men still “. . . sweated as if running races in the tropics,” Amundsen said.

The Glacier offered many perils, mostly hidden crevasses covered with thin layers of ice and snow. But there was one stretch on this upward climb which Amundsen and his men agreed was the worst of all. This was a part of the trail that looked like a giant frozen lake. There was no way of getting around this treacherous-looking area so the explorers began to cross it very carefully. Their steps made a hollow sound, as though walking on empty barrels. Amundsen and his companions soon discovered why—after some of the dogs and drivers had plunged through the ice.

The surface ice proved to be extremely thin with empty space beneath it. About three feet below another layer of ice was seen. Neither layer proved strong. Again and again the dogs fell through the top layer only to be pulled out by their harness in the nick of time. The men also went through, with Bjaaland having the closest escape from death. He fell through the two layers but caught hold of a rope on his sled just in time to pull himself out.

By the first of December, Amundsen and his companions had left the worst part of their journey behind them and were on top of the Polar Plateau at last. Despite the grueling experience, for men and animals alike, all were in excellent condition as they reached this most important stage of their polar march. When they made their first camp on the Plateau, they had to prepare for the saddest experience of the whole journey. The Huskies not needed for the final dash to the Pole were now to be destroyed.

From the beginning of his expedition, Amundsen had planned to take more dogs than were really needed for the march to the Polar Plateau. He did not know how many would survive the hard climb up the glacier. Now, that the Plateau had been reached, the extra Huskies were no longer useful and would have to be killed. Their flesh would serve as food

for the remaining dogs, and the explorers as well. The idea of using the extra dogs as food made it possible to cut down the amount of supplies to be carried on the sleds. Twenty-four of the faithful, hardworking animals were killed and butchered. The men were left greatly saddened. By now they had become great friends with the semi-wild dogs. This camp was named the Butcher's Shop.

Amundsen and his companions remained here for five days, resting and eating their fill of dog flesh. Besides fresh dog meat, the explorers satisfied their hunger with pemmican, biscuit, chocolate and milk powder. Their diet was evidently a good one because at no time was there any sign of scurvy. Here, too, a raging blizzard closed in on the explorers, forcing them to camp longer than they had planned. Their anxiety to move on became so great on the sixth day that they decided to strike out, regardless of the wind and snow.

Because the sun was blotted out by the gray, snow-filled sky, the explorers could not check their position with the use of navigational instruments. The compass was the exception. Using this instrument plus a distance meter attached to the sleds, Amundsen and his four colleagues started out on a southward course.

For several days they traveled through stormy weather without seeing the sun once. When it finally did come out, they quickly checked their position with the sextant. They felt good when the results were found to check perfectly with their dead reckoning figures. Latitude 86 degrees 16 minutes south had been reached, which was not far from the most southerly point traveled by Shackleton. Pushing onward as fast as they could, the men made frequent checks on their position so that they would know exactly when they passed Shackleton's mark.

On December 7, 1911, Amundsen was leading the party across the vast, frozen plain of the Polar Plateau. It had been

his turn that day to be the front-running man. He was suddenly awakened from the daydreams into which he had fallen by shouts and cheers from the drivers behind him. Amundsen turned and saw the Norwegian flag fixed to Hanssen's sled snapping in the breeze. This was the signal among the explorers that they had gotten beyond Shackleton's record of 88 degrees 23 minutes south. The sight of his country's colors at this historic moment brought tears to Amundsen's eyes. The Norwegians were jubilant over their triumph. Photos were taken of the party and their barren surroundings, and then they moved on several miles farther. Here the explorers camped and made their final plans and preparations for the march to the South Pole.

It was decided to lighten their loads by placing surplus food and equipment in one last depot. The men took along enough food to last a month for themselves and the dogs. Amundsen felt that this would be ample even if they missed finding this depot on the return march and had to go on to the next one farther north. To make sure there would be no difficulty finding it, the explorers built a snow shelter around the supplies and carefully marked the spot with wood strips—made from foodcases—and bits of rag. The markers were strung out in an east-west direction, at right angles to their trail. Thus, if they swerved to the right or left of their original trail on the northward journey, the explorers would be almost certain to spot one of the wooden sticks.

To make still more certain that they would have no trouble finding this last of their food depots, Amundsen decided to build snow beacons every two miles on the last leg of the polar march. Snow beacons are made from blocks of snow which the men cut out with knives and shovels and then stack one above the other. Usually they are made about as high as a man and can be easily seen from a long way off. Because of

the vast level region of the Polar Plateau through which they were now moving, the men built theirs only about three feet high.

On December 9 the depot was completed and the explorers set out once more for their main goal. They estimated that they should arrive at the Pole on the fourteenth of December, providing they met with no difficulties. They were lucky. Both the surface and weather conditions were perfect. The sun shone most of the time, and there was little annoying wind. For the most part the temperature remained at ten degrees below zero, which is balmy for Antarctica. According to their barometer and altitude meters, the explorers discovered that the Plateau surface over which they were now traveling began to slope downward toward the south. This surprised and pleased the men because it made traveling much easier.

Amundsen and his companions checked their position on the thirteenth of December and found that they were at latitude 89 degrees 37 minutes south. This was very close to victory. They began to feel excited and tense. "It was like the eve of some great festival that night in the tent. . . . I was awake several times during the night and had the same feeling that I can remember as a little boy on the night before Christmas Eve—an intense expectation of what was going to happen." These were the words Amundsen put in his journal to describe his own feelings.

The next day the explorers crawled out of their sleeping bags quickly. They breakfasted and broke camp faster than on any other day of their journey. All were anxious to complete the few remaining miles to the Pole. At three o'clock in the afternoon of December 14, the explorers shouted, "Halt!" as one man. According to the distance meters, which were being watched closely, they had arrived at the South Pole. "The goal was reached, the journey ended."



Library of Congress

Amundsen and companion taking observations at the South Pole.

Once again the Norwegian flag was brought out and, with five weather-worn hands grasping the staff, planted in the snow at the South Pole with these words: "Thus we plant thee, beloved flag, at the South Pole, and give to the plain on which it lies the name King Haakon VII's Plateau." The explorers then pitched their tent and prepared to check their position with their navigation instruments.

Of course, Amundsen had not reached the exact spot of the South Pole's location. The instruments which they used at the time were not as accurate as more modern ones. So, in order to make sure that they were definitely as close to the Pole as

it was then possible to get, they decided to march in three different directions from their camp. These marches would be for a distance of twelve and a half miles. The length of these marches formed a radius of an imaginary circle around their camp, twenty-five miles across. Somewhere within this circle was the exact position of the South Pole.

The Norwegians called their camp Polheim, and they remained at the South Pole for four days. Much of the time was spent making frequent checks of their location. The mass of calculations which they gathered would be studied when they returned to Norway to make certain that they had reached latitude 90 degrees south. The men were also busy with their equipment for the homeward march. One of the dogs had to be destroyed because it was worn out from the long journey. This left sixteen dogs for the trip north. The explorers divided these into two teams for hauling the two sleds back home. It was decided to leave Bjaaland's sled at the Pole along with a small tent.

The explorers fixed a tent pole bearing a small Norwegian flag to the top of the tent. This made a marker about thirteen feet high. The tent was firmly anchored on the snow with guy ropes so that gales would not blow it away. Before the tent was laced up very tightly, Amundsen left a little bag inside which held a letter written to the Norwegian king telling of the explorer's achievement. He also left a brief note for Captain Scott, in case the Englishman should successfully reach the Pole, asking him to deliver the letter to the Norwegian king. Amundsen felt that he and his men were a long, long way from home and safety and that almost anything could happen to them. If the letter were found, in the event of disaster, then the world would know what they had accomplished.

A sextant, Eskimo boots, mitts and reindeer-skin foot bags

among other items were also left inside the tent. Finally, each of the explorers, Amundsen, Bjaaland, Hanssen, Wisting and Hassel, went inside the tent and signed his name to a tablet attached to one of the tent poles. After this dramatic moment the explorers picked up their old trail for home. The weather still favored Amundsen and his comrades as they sped northward. The day they left Polheim, the temperature was unusually mild—minus two degrees Fahrenheit.

Amundsen and his men made it back to Framheim in fast time and with few adventures. The dogs, eager to be on the move again, were held to a distance of about seventeen miles a day to conserve their strength. The snow beacons proved to be wonderful guides and the explorers had little difficulty picking up the food depots they had left behind. In fact, they were so well fed toward the end of the homeward trek that they were actually throwing food away. At four A.M. on January 25, 1912, the tired but happy South Pole conquerors slipped into Framheim. They returned with two sleds and eleven dogs, and the whole party was in fine physical condition. The polar march had taken the explorers ninety-nine days during which time a distance of close to 1,860 miles was covered.

Although he achieved great fame as the first to reach the South Pole, Roald Amundsen never returned to the Antarctic. His great interest, as even before his south-polar achievement, lay in the Arctic. He made a number of visits to the Arctic region after his South Pole triumph. In 1926 he accompanied Lincoln Ellsworth in an airplane flight to the North Pole, which satisfied a long-held desire. Two years later, Amundsen went on a rescue mission to the northlands in search of the Italian explorer Nobile who, on his return flight from the Pole in the dirigible Norge, had been forced down. Roald Amundsen was never heard from again.

5

SCOTT'S TRAGEDY

EVER SINCE his visit to the Antarctic with the British Expedition of 1901–04, Captain Robert Scott had found it hard to forget the fascination of the frozen continent. He had almost succeeded in being the first to reach the South Pole and his failure refused to leave his mind. Scott promised himself that if he should ever visit Antarctica again he would surely get to the Pole. In 1910 the explorer was given the opportunity he wanted when the British government decided to send another party to the Antarctic headed by Captain Scott.

This British Antarctic expedition had two main jobs to perform. First, it was to gather as much scientific information about that icebound land as possible and, second, to explore new areas of that continent. This last instruction also meant that if the explorers could, they were to try to reach the South Pole. Scott plunged into the work of organizing this expedition with great enthusiasm and speed.

An old whaling ship was bought and rebuilt to carry the adventurers to the south-polar region. Named the *Terra Nova*, the vessel was driven by both sails and steam. As for the men

who were to make up his party, Scott had no end of volunteers from whom to choose. The expedition had aroused great interest in England and a large number of scientists and adventure-minded men were eager to join the famous explorer. When Scott completed his selection, he had chosen a dozen scientists, seven naval officers and fourteen enlisted men. The scientists were specialists in the fields of geology, meteorology, physics and biology. Dr. Edward Wilson, who had been with Scott on his first expedition, was placed in charge of the scientific group. At last, after weeks of gathering food supplies, clothing, materials for building the winter hut, transport equipment, the *Terra Nova* left England on June 15, 1910, and put out to sea for Melbourne, Australia.

This part of the expedition's journey was made easily enough, and when Captain Scott arrived in Melbourne he was given the telegram sent by Amundsen. The news that the Norwegian explorer was also headed for Antarctica came as a complete surprise and shock. Back in England Scott had heard of Amundsen's preparations for a polar expedition. But he as well as most people had thought the Norwegian was headed for the Arctic. The South Pole, Scott believed, would be his to conquer alone. The telegram dashed his hopes. It was difficult enough to face and overcome the everyday problems which an explorer met with on Antarctica, but to have to think of someone else beating you to the goal, that was upsetting indeed.

Later, as the first feeling of disappointment wore off, Scott accepted with his usual good spirits the changed conditions which Amundsen had created. He felt that the best and only thing for the expedition to do was to carry out its original plans, "without fear or panic," as though Amundsen had not been heard from.

A more determined man than Captain Scott would have

been hard to find. He forgot about Amundsen's telegram for the time being and concentrated on the more important work of getting last-minute supplies aboard the *Terra Nova*. The expedition had one other stop to make after leaving Melbourne. This was a brief halt in Port Chalmers, New Zealand, where nineteen Manchurian ponies and thirty-four sled dogs were put aboard the ship. Captain Scott and his men had their final glimpse of civilization at this port which they left on November 26, 1910.

The *Terra Nova* was no stranger to the storm-driven Antarctic waters. As a whaling ship it had often sailed this stormy region and weathered many a wild gale. But several days after leaving New Zealand, on December 2, the ship very nearly met its last storm and almost put an end to Captain Scott's Antarctic expedition. While passing through a region called the "roaring forties," where some of the world's most furious storms rage, Scott's ship was struck by a screaming gale. Mountain-size waves battered the little vessel and tossed it about like a leaf in a wind storm. The *Terra Nova* was dangerously overloaded. Every inch of the vessel above and below decks was crammed with supplies. The top deck, in fact, was jammed with tons of coal, dozens of cans of petroleum as well as the chained dogs. The vessel lay deep in the water and it was easy for the giant waves to crash down upon its deck. The *Terra Nova* rolled and pitched and was hard to control.

As the overpowering seas smashed upon the deck with boiling white foam, lashings on the cargo were torn loose. Bags of coal became like shot from a cannon crashing into and tearing free the cans of petroleum. The crew worked like demons to catch the tumbling cans and tie them down before they added fire to the ship's difficulties. At the height of the storm, word was brought to Captain Scott that the water pumps were knocked out of action. Sea water was pouring below decks in

torrents and flooding the engine room. A bucket brigade was hastily organized and worked furiously hour after hour passing countless pails of water from below to the deck. The men fought an even battle with the incoming water.

In the meantime, the engineer and several assistants were working in water up to their shoulders trying to get the pumps going again. By the time the storm blew itself out, the men had the pumps working and the *Terra Nova* was out of danger. The storm had been a costly one to Captain Scott and his companions. The ponies and dogs had suffered cruelly during this frightful part of the voyage. The wild rocking of the ship and the constant soaking by the cold water terrified the animals. Two of the ponies died and one dog was torn loose from his chain and swept overboard.

On December 9, 1910, with the nightmare storm still fresh in memory, Captain Scott and his men entered the pack ice. The ice barrier was unusually heavy this year. Time and again the floes blocked his path, and often the open water leads froze to lock the ship in. The *Terra Nova* made slow progress, and Captain Scott began to lose his patience. He had counted on getting through this obstacle quickly so the expedition could take advantage of the short Antarctic summer to build their camp and to lay depots. As it was, a little more than three weeks were needed to break out into the Ross Sea.

Captain Scott had planned to head for Cape Crozier and set up his winter base there. He remembered the location from his first expedition and felt that it was best suited for the purposes he now had in mind. Most important of the location's many advantages was its fine approach leading to the Polar Plateau and the South Pole. It also offered a good place to build a hut, study the penguins and make practice runs on skis. As the explorers sailed close to Cape Crozier, however, they found that it would be impossible to anchor the ship because of the

heavy swells. Scott was disappointed and had to set about looking for another base site. This was just one more of the growing number of disappointments and discouraging problems that pursued him.

The *Terra Nova* was turned around and headed for McMurdo Sound in the western part of the Ross Sea. The expedition found a finger of rocky land pushing out into the ice-filled water which looked good for a camp. Scott called the location Cape Evans, in honor of Edward Evans who was second in command of the expedition. The base site was a little more than ten miles from Hut Point which had been used by Scott on his 1901-04 explorations. An unbroken stretch of thick ice prevented the explorer from reaching his old base which he had also considered using.

Once it was agreed that the Cape Evans location would serve their needs, little time was lost in getting the supplies and equipment unloaded. The job was begun on January 6, 1911, after the *Terra Nova* had been anchored against a solid wall of ice. The equipment had to be carted about a mile and a half across the ice from the ship to the base location. To test the surface and see if it could support heavy loads, a group of the explorers went out on the ice first before any of the supplies were landed. During the Antarctic summer months the warmer temperatures often cause the pack ice to break up and float out to sea. The testing party returned with news that the ice was safe to travel over and soon supplies poured out of the ship to the camp site in a steady stream. The ponies and dogs were put to work hauling the sleds. But there were times when the men did some of the pulling themselves.

Although the ice looked thick and safe enough, the unloading job was not finished without incident. Captain Scott had brought along three sleds that were powered by motors. These were heavy vehicles and there was considerable worry among

the men until they could get the machines across the ice onto solid land. Two were brought ashore safely. The third hit a soft spot in the ice and plunged into deep water beyond salvage. The men who were guiding this motorized sled leaped off in time to escape going down with the machine.

Among the first of the items taken off the *Terra Nova* were materials for building the explorers' winter home. Those not occupied hauling supplies were busy with hammers and saws putting the hut together. Since Scott planned to winter with a large party of more than thirty men, the hut was of a generous size. It measured fifty feet in length and half that in width. The walls were made of several layers of wood with an insulating paper sandwiched in between. To make more certain that the freezing Antarctic winds could not find their way inside, sand was shoveled up against the sides of the hut.

By the end of January the hut was near completion and Scott began preparations for hauling supplies to the south to be stored in depots. Since much of the route from the winter base to the top of the Ross Ice Barrier was rough and treacherous, a party headed for the Pole with heavily laden sleds would find the going very difficult. In order to make this job a little easier for next season's travels, Scott planned to move as much food and equipment as he could beyond this bad stretch. The explorers bound for the South Pole could then start out less burdened and pick up what they needed at the depots. These stores of supplies, of course, would also be extremely important for the men on their way home from the South Pole.

Eight sleds hauled by ponies and two by teams of dogs were used for the depot-laying work. One of the food stores closest to the base was placed at a point called Corner Camp. The depot was given this name because the route at that spot made a turn to the south in the general direction of the Pole. The

other depot, much larger, was located on the top of the Barrier a little more than 135 miles from Cape Evans. Because of the great amount of food and other supplies left at this location, the depot was called One Ton Camp. Since this was to be the most important of the depots for the explorers on their homeward march, great pains were taken in marking it. Black flags were used to spot the miniature mountain of food supplies. Tin boxes filled with biscuits were placed on top of the mound so that sunlight striking the shiny metal would shoot out reflecting rays. Sleds, to which tins of tea were tied, were placed upright in the snow around the depot. Finally, Scott and his men built snow cairns, about as high as a man, near the depot. They were sure now that they would have no trouble finding this food supply.

The successful depot-laying work during the last weeks of the Antarctic summer was a great relief to Scott. But the disappointments which seemed to haunt him since the day he received Amundsen's telegram continued. The ponies, on which the explorer relied so much for next summer's march to the Pole, could not stand the strain of the depot-laying marches. Three of the animals became exhausted before the journeys were completed and had to be sent back to the base. Two were so far gone that they died before reaching home.

As though this were not enough, the last of the ponies that had been taken on the march drifted off on an ice floe. This happened at the end of the return trip when the animals were being led across the bay ice to the camp. The ice was not firm enough and broke into large floes under the weight of the ponies. The pony drivers tried frantically to save the animals as they began floating out to sea. The drivers used ropes to pull the beasts to firmer footing. But only one of the ponies could be saved. Scott had now lost more than half of the ponies since the beginning of the expedition. This was a terrible setback to



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One of Captain Scott's Manchurian ponies, which he favored over huskies for transporting supplies at Antarctica.

his plans and forced the explorer to make serious changes in his preparations for the South Pole.

While Scott and his party were away establishing depots, the base camp at Cape Evans was a beehive of activity. Some members of the expedition were busy adding the last bit of covering and driving the last nail into the hut to make it extra snug for winter. Others were setting up the instruments for making daily checks on the wind and temperature throughout the Antarctic winter. Although the expedition had brought along immense quantities of food from home, it had been de-

cided to include a good deal of seal meat in the men's diet. This meant that parties were sent out almost every day hunting for seal. Since many of the expedition members were strangers to the use of skis—an absolute necessity for getting about on the snow and ice of Antarctica—training marches were also held daily.

Even though the expedition had a full schedule of work and training, there was lots of time for fun and relaxation. When Scott and his group came back to camp, they often played football. This was not the same kind of football which we know in America. It was the European game in which the players use their feet, for the most part, to kick a ball across an opponent's goal rather than their arms to carry the ball across. Teams were chosen from among the explorers and, toward the end of the day when most of the chores had been taken care of, the games were played on a nearby level part of the camp. These were exciting contests as the players ran and charged about after the ball in wild scrambles, their shouts ringing clearly in the still Antarctic air. Scott enjoyed these games no less than his men and, when his work permitted, never failed to play. It was a pleasant way to keep the men sound in body and mind. The football games continued until the darkness of Antarctic winter set in.

Captain Scott had been fortunate in his selection of men for the South Pole expedition. They were a friendly, cheerful lot with a wide variety of talents and skills. Although living together in a crowded hut day after day was apt to cause short tempers, the special qualities of these men helped them through the long winter night without any hurt feelings. Scott had given a good deal of thought to this period of their stay on Antarctica. After the sun's last appearance on April 23, he was ready with a regular program of indoor activities to keep his men busy and contented.

While the men were putting the equipment and clothing in first-class condition, Captain Scott and his small staff checked and rechecked their plans for the dash to the South Pole. The most important part of these plans was to make certain that the right quantity and type of food was taken along.

The scientists checked their weather instruments daily, even though at times blinding snow and howling winds made walking outdoors dangerous. The instruments were located in a special shelter some distance from the main hut. To reach these during a fierce blizzard was often an adventure. Bent almost double over their skis so that the powerful wind would not blow them over, the men would grope their way through a heavy curtain of snow to the weather station. Although the distance was not far, they sometimes lost their way.

Several evenings a week throughout the Antarctic winter, lectures were given by specialists in a particular profession. Some of the subjects that were covered included meteorology, biology, physics and geology. One of the most popular of the winter talks was given by Ponting, the official photographer of the expedition. In addition to explaining the more technical points of photography, he would entertain the audience with slides of scenes from various parts of the world which he had visited with his camera. On the evenings when no lectures were given, the men would spend their time reading or sitting about comfortably, smoking and talking.

A small newspaper, called the *South Polar Times*, was also published by Scott and his companions during the long Antarctic night. Everyone had a chance to contribute something to the paper, whether it was serious or funny. Dr. Edward Wilson who, besides his medical talents, was a fine artist, often made drawings for the newspaper. Birthdays and holidays were big events in the daily routine of Scott's men. Special rations were then broken out by the cook. One holiday which

Scott's men looked forward to with a great deal of pleasure was Midwinter Day, which in this year fell on June 22. On this day the Antarctic winter is exactly half over. It called for a big feast and among the delicacies served were roast beef, horseradish sauce, Brussels sprouts, mince pie and chocolate as well as liquors, wines, champagne and brandy. For their after-dinner enjoyment, cigars, cigarettes and pipe tobacco were passed around. Those who had not overeaten and could still move topped the festivities with dances and songs which were greeted enthusiastically by their companions.

These were some of the ways Captain Scott and his men passed the seemingly endless Antarctic night. Good fellowship, together with the daily schedule of work and recreation, brought them through in excellent spirits and health after weeks of being shut in. To Scott's delight, there wasn't a sign of scurvy among the men when the sun returned on August 22nd.

Daylight meant that the men could go outdoors again with some measure of safety. Scott lost no time now with his preparations for the polar journey. Men and ponies and dogs were sent out daily on short marches to strengthen their muscles which had become soft during the winter's rest. By the first of November, Captain Scott was ready to shove off on his great adventure.

The route which Scott planned to follow to the South Pole lay across the Ross Ice Barrier, then up the Beardmore Glacier which Shackleton had found, to the Polar Plateau. The hardest part of the journey, the explorer knew, would be across the Barrier and the climb up the glacier to the Plateau. In order to reach the top of the Plateau, Scott felt it necessary to take a large group of men, the ponies, dogs and motorized sleds. From time to time, as the small army of explorers advanced along the trail, certain of them would be sent back to camp,

their help no longer needed. By the time the foot of the Beardmore Glacier was reached, almost all the animals would have returned to the base. The explorers remaining with Scott would do most of the hauling of sleds laden with supplies to the Polar Plateau. From here on Scott and the four companions he planned to take along would make the last stage of the march to the Pole. Everything had been thought out carefully, and there was high hope in their hearts that they would reach their goal successfully. They were all in good spirits as they set out from their Cape Evans camp on the first of November.

For about a week everything went along smoothly. The weather was kind, and the party was covering a little more than ten miles a day. Then, without warning, Scott's troubles began. The motor-powered sleds broke down under the rough snow and ice and cold. Try as they would, the drivers could not get them to budge. The powered sleds had to be given up. The sleds that had been drawn by machines now had to be hauled by men.

The weather, which can change within a few hours on Antarctica from bright sunshine to a raging blizzard, also began to add to Scott's difficulties. Snowstorms and strong winds as well as treacherous footing on the snow and ice slowed the marchers. The wind was a particular curse to the men, cutting through their garments like a knife. If conditions were bad for the men, they were far worse for the ponies. By the middle of November the animals were showing serious signs of breaking down. The first one had to be shot shortly after passing One Ton Camp. At regular intervals thereafter the remaining seven had to be destroyed to end their suffering. Their meat was used to feed both men and dogs. The Huskies were a particular surprise to Scott at this time. They behaved and worked far better than he had expected.

The loss of the ponies before they had served their purpose was a blow. Although he hadn't really counted on them, Scott hoped that several of the ponies would be on hand to help pull the heavy sleds up Beardmore Glacier. Instead, the men had to do this tiring work themselves. A raging, four-day blizzard which fell upon the little band of explorers hastened the end of the ponies. When the storm was over, it had left the trail covered with deep soft snow. The ponies sank up to their bellies in the drifts as they slowly plowed forward. Struggling through the soft snow while hauling bulky sleds was more than the animals could stand. Scott and his companions soon realized that Chinaman, Jehu, Nobby and the other poor beasts had to be put out of their misery. It wasn't easy for the drivers to shoot their ponies. They had grown fond of the animals, feeding them and nursing their wounds.

By December 10, Scott and his men were well along their slow, painful climb up Beardmore Glacier. At one stage of the trek, food was stored at a spot called Lower Glacier Depot. During this stopover, Scott sent the dog teams back to the main camp with two of the expedition members. This reduced the polar party further. Two others had already been ordered back on November 24, when their help was no longer needed.

Scott wrote a note for those back at the base camp which he gave to the dog-team drivers to deliver. He let those at Cape Evans know that they had reached the Beardmore Glacier but that things were not as good as he would have liked them to be. He added, however, that the spirit of the men was fine and all had hopes that their luck, especially in regard to the weather, would turn for the better.

In a little less than two weeks after leaving the Glacier Depot, the party was almost at the top of the Beardmore. Four more members of the group were sent back to Cape Evans on

December 21st. This left eight men to continue the march. Christmas Day arrived and was spent on the glacier at latitude 85 degrees 50 minutes south. The men had made an especially good march that day and this, with the holiday, put them in a happy mood as they camped for the evening.

Scott and his companions huddled in their tent at meal-time and exchanged lots of cheerful talk. To the usual pemmican, biscuit and "hoosh," the explorers added a few holiday extras for their meal that evening. There were slices of pony meat flavored with onion and curry powder, plum pudding, cocoa with raisins and a dessert made with caramels and ginger. The hungry travelers gorged themselves on their Christmas feast and agreed they hadn't felt so good since leaving Cape Evans. The next day found them eager to be off, their festive meal a pleasant memory. Straining against their leather harnesses, pulling the heavy sleds, Scott and his men plowed ahead along the last few miles of the glacier trail. The Polar Plateau was now in sight.

On January 3, Scott figured that they were a little more than 140 miles from the Pole. Their food supply was more than enough to see them through to the goal and back to the depots they had left on the trail. Scott was confident that they would reach the South Pole. Before beginning the last lap of the journey, however, the expedition leader decided to make his party smaller. Some of the members had begun to show the strain of the grueling march and were weakening. Remembering his experience with Shackleton, Scott did not want to take the chance of having anyone break down now that the Pole was almost in his grasp. These men would have to go back to the base.

But Scott wanted to reduce his party for another reason. He had noticed, just as Amundsen had, that fewer men could break camp and get out on the trail in much faster time than a

larger group. Little time could be wasted on the dash to the Pole and the return journey. So Scott chose three of the explorers to return while he, Dr. Edward Wilson, Captain L. E. G. Oates, Lieutenant H. R. Bowers and Petty Officer E. Evans pushed on to the Pole. The men selected to go home felt badly about leaving and next day, after turning most of their food over to Scott and his companions, bade their friends a sad farewell.

Now that the polar party was off the Beardmore Glacier and up on the Plateau the route was a lot easier. Although they were battered now and then by blizzards and strong winds, the surface at least was level and not at a steep angle. By January 9, the explorers had pushed south as far as 88 degrees 25 minutes which, Scott knew, placed them beyond the point Shackleton had reached. This, plus good weather and easy surface conditions, was great encouragement.

Captain Scott was cheerful and optimistic and inspired his companions as they plodded mile after mile over the monotonous level of the Plateau. The leader of the polar party was pleased with the men whom he had picked to go with him to the ultimate goal. In Scott's eyes, Wilson was like steel, Evans was a tremendous worker, Bowers was a tireless hiker, while Oates was taking the hardships like the true soldier that he was.

Three days later, on January 12, things suddenly changed, and the explorers began to run into hard luck. Their route took them over a stretch of snow which, instead of allowing the sleds' runners to glide easily, acted as a drag. The men had to pull doubly hard to get the sleds over this obstacle which cost them a good many precious miles. After pulling the sleds all day long, they had traveled only ten miles.

The strain of hauling sleds under these conditions, added to the ordeal they had already been through climbing the Beard-

more, sapped their strength more than they realized. Although the temperature at this stage of their march was not excessive, the men began to complain of the cold cutting through their heavy garments. However, Scott and his companions plowed ahead. On January 15 they reached latitude 89 degrees 26 minutes south. They were now only twenty-seven miles from the South Pole, a two-day march.

While camping at this point, Scott began to think of Amundsen and wondered whether the Norwegian had beaten him to the Pole. The English explorer had his answer the next day.

The five men had been tramping along only a few hours when Bowers spotted a black object ahead. As the explorers drew closer they saw their worst fears realized. A black flag was fastened to a sled planted upright in the snow. Amundsen and his party had won the race to the Pole. All around the sled were countless dog tracks, some going north, others south. There were also signs of a camp. "This told us the whole story," Scott wrote in his journal. "The Norwegians have forestalled us and are the first at the Pole. It is a terrible disappointment, and I am very sorry for my loyal companions." The explorers were so disturbed over the discovery that none could sleep that night.

The next day, January 17, Scott and his exhausted companions headed over the last few miles to the South Pole. Their happy spirits of two days ago were now replaced by deep gloom. There were no cheerful calls of encouragement as they plodded wearily over the monotonous landscape. And just at this time the weather decided to add to their misery. A sharp wind arose, sweeping sandlike particles of snow and ice against the struggling explorers. The temperature dropped to minus 22 degrees, which made matters still worse. The worn clothing and tired bodies of the explorers offered little protection against this deadly weather combination. They suf-

ferred painfully from the intense cold, especially in their hands and feet.

At last the sled meters and the sight of the little black tent left behind by Amundsen told Scott that he had reached the South Pole, 90 degrees south. The British explorers lost little time getting up their own tent. They had no intentions of staying long at this desolate spot. Scott was worried about the physical condition of his men and wished to start north as quickly as possible. They had a long, rough road to travel on which almost anything could happen. Despite their disappointment over losing the race to the South Pole, the explorers added a few extra specialties to the evening meal to celebrate their successful march. All the men had double rations of pemmican, biscuit and "hoosh." For dessert there were bits of chocolate and then a prized after-dinner cigarette.

The next day, with the use of the sextant, the explorers tried getting as close as possible to the exact location of the South Pole. Their calculations placed the Pole about two miles from the spot which Amundsen and his men had figured out. To mark the South Pole's location, Scott and his men built a cairn on top of which they fixed the Union Jack. The temperature at the time was an uncomfortable minus 21 degrees.

Their brief stay at the South Pole ended on January 19, when Scott and his tired companions headed north and picked up their old tracks. More than 800 miles of weary marching lay before them. Their leader wondered whether they could do it. One of the many difficulties which they faced day after day was to keep on their old trail so that they could find the food depots they had established on the outward journey. It wasn't easy, as Amundsen had also discovered, to march in a desired direction on a frozen white plain without any natural markers. The Englishmen had built snow beacons to help them find the right way back. But the distances between



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Captain Scott and his four companions at the South Pole.

the beacons gave them trouble because snowstorms and wind had largely covered the explorers' tracks.

But there was one thing they had in their favor. The wind was now at their backs, which made hiking a lot easier. The men even rigged up crude sails on the sleds so that the wind could help them with the hauling.

After four days on the march, during which time they made good progress, Scott noticed the first signs of what was soon to be serious trouble. Evans had a hard, white frostbitten nose as well as several frozen fingers. More serious, he was deeply discouraged. Oates was also beginning to weaken badly

and couldn't seem to keep his feet warm any longer. Scott, Bowers and Wilson appeared to be the sturdiest of the group.

Two blizzards in rapid succession swooped down upon the battered men, forcing them to camp against their wishes. The delay made them dip into their precious stock of food before they could reach the depots. On February 4, Evans fell into a crevasse, striking his head on the iron-hard ice on his downward plunge. Luckily, his comrades were able to pull him out, but Evans never seemed to recover from the fall. In addition to his frostbitten face and hands, Dr. Wilson believed the unfortunate Evans had suffered a concussion of the brain. Scott relieved Evans from hauling the sled and only hoped that his injured companion could keep up with the group. To have to haul a sick man on a sled through the no-man's land of the Polar Plateau, while still hundreds of miles from their base, would be a serious handicap. It could mean a threat to the safety of all.

For two weeks Evans trailed his companions as best he could. Many times he stumbled and halted and dropped far behind the main group. His comrades would then stop and wait for him to catch up. By this time the group was off the Polar Plateau and on Beardmore Glacier. Although the glacier meant that the explorers were inching closer to home, it did not make the route any easier. In fact, the glacier added to their difficulties because of its countless treacherous crevasses. Several times while trying to work their way around these danger areas the men became lost and could not find their precious food depots.

This part of the journey was too much for Evans. On the sixteenth of February Scott noticed that his sick companion was no longer in his right mind. The next day, while Evans was trailing the main party as usual, Scott decided to camp and have lunch until Evans caught up with them. But Evans

seemed to make no progress and his companions suddenly became alarmed and went out after him. Scott reached Evans first and found the man on his knees with his clothing partly off and his gloves removed. When his leader asked what the matter was, Evans answered that he did not know but thought he had fainted.

Scott helped his friend to his feet, but Evans quickly collapsed again. He was put on a sled then and hauled back to camp. But there was little Dr. Wilson or his friends could do for a body that had broken completely under the strain of marching. P.O. Evans died quietly in the company of his small group of comrades. With gentle care the explorer was buried beneath the snow of Beardmore Glacier.

Now that they no longer had to worry over a sick companion, the explorers made better progress. By the first of March they were off the glacier and down on the Barrier Ice Shelf. Once in the lower altitudes, Scott and his companions expected to find the temperatures more agreeable. To their great disgust and discomfort, the weather turned colder. The mercury was almost continuously in the minus thirties and often dropped to forty and more below zero.

The explorers picked up the Middle Barrier Depot on March 2, where Scott not only expected to replenish his provisions but also the oil supply which was beginning to run low. Search as they might, the explorers could not find the fuel. This was a serious blow since the next depot was about seventy miles away and there was only enough oil left to last a few days. Once the men ran out of oil, they would be unable to cook their meals or melt snow for drinking water.

This wasn't the only trouble Scott ran into that day. Oates reported that his toes were frostbitten and walking had become a torture. The minus thirty- and forty-degree temperatures were beginning to take their toll of the exhausted ex-

plorers. For the first time Scott began to feel doubtful about their chances of pulling through safely.

Plagued as they were by hardships, they stubbornly pushed ahead. Oates' feet were getting worse each day so that he soon became a drag on the party. "It is pathetic enough," said Scott, "because we can do nothing for him . . . we cannot help each other, each has enough to do to take care of himself. . . . One can only say 'God Help Us,' and plod on our weary way. . . ." And a weary way it was. The men were rapidly losing the last of their strength. Their stamina was being sapped not only by the deadly cold and terrible surface over which they were dragging the sleds but also by a shortage of food. They were covering only five miles a day when they should have done at least double that figure.

By March 10 Scott and his comrades were in a bad way. All the men were now suffering from frostbite, with Oates the most serious victim. The combination of wind and cold was knifing through their ragged clothes. Things were not made any easier when they came at last to their depot at Mt. Hooper only to find a pitifully small amount of supplies left. The homeward-bound members of the support teams had taken a large share of the food and fuel for their own needs.

At this point Scott figured that they had enough food to last until they reached within thirteen miles of the next supply base which was One Ton Camp. This was about fifty-five miles away. His estimates were made for the very best conditions. He dared not think what would be the case if bad weather or other difficulties slowed their march.

On the fifteenth of March Oates was the second member of the expedition to die. During the early hours of the previous day, Oates felt that his end was near and urged his companions to leave him in his sleeping bag while they moved on. But Scott and the others ignored the sick man's pleas and urged

him, instead, to get up and try to march with them. Oates called on the last of his strength and started out with his comrades. They managed to cover a few more miles before camping for the night.

Oates never expected to see his friends again when he crawled into his sleeping bag that night. He left a message to his mother and to the Inniskilling Dragoons, his beloved regiment in which he was a captain. He wanted his fellow soldiers to know that he had died a brave man. But Oates did not die during his sleep. He woke up in the morning and seemed actually disappointed to find himself still alive. The weary man crawled out of his sleeping bag and although a blizzard was raging outside the tent, said to his companions, "I am just going outside and may be some time." Oates walked out into the raging storm and that was the last the others saw of their comrade.

"We knew," Scott wrote in his journal, "that poor Oates was walking to his death, but though we tried to dissuade him, we knew it was the act of a brave man and an English gentleman. . . ."

After the storm and the disappearance of Oates, Scott and his two remaining fellow explorers, with their spirits low and strength all but gone, struggled onward. All three men were now suffering severely from frostbite. They were able to warm up a little only at mealtime when they ate their pitifully small amounts of food. They were trying to make their short supplies last until they reached One Ton Camp. The men also tried to ease the job of pulling the sleds by removing some of the supplies. A theodolite, camera, and certain pieces of camping equipment were stacked at the side of the trail. But the effort was in vain. The progress of the explorers was still slow as they stumbled over the treacherous, icy Barrier surface.

On the twenty-first of March the British polar party pitched camp eleven miles from One Ton Camp. If the depot could be reached, Scott believed they would win through their ordeal. The men had saved on their skimpy rations so well that at this point they had enough food to see them through to the big supply depot. But the changeable Antarctic weather decided now to add the final, crushing blow to the hopes of the explorers. The day Scott and his companions put up their tent a blizzard began and raged on for a full week. The men were trapped inside their flimsy shelter and were forced to eat the last of their food. When the storm began, Scott and his two companions had only enough fuel to make two cups of tea for each and food to last two days.

Every day the worn-out explorers peered hopefully out of their tent for signs of the storm's end. But the wind kept blowing with brutal force and the snow continued to fall in a thick white curtain. Their hope of reaching home alive sank lower and lower. Snowdrifts, man-high, closed in on them. Marooned in their frail tent, without oil or food, Captain Scott, Dr. Wilson and Bowers slowly starved and froze to death.

Eight months later, in November, 1912, members of the British expedition who had waited in vain at Cape Evans for the return of their leader and friends, went out in search of the lost explorers. They found the tent almost covered by huge mounds of snow. When the search party shoveled it clear they threw back the flap and saw Scott and his two fellow explorers huddled together as though they were in peaceful slumber. Scott had his arm flung over his good friend Wilson. Beneath the shoulder of the expedition's dead leader were found letters which he had written during his dying moments to his family and friends in England. Scott's journal was also recovered and in its pages his sorrowful friends found a day-by-day story of the whole tragic march from the South Pole.

The last entry Scott made was on March 29th. "Since the 21st we have had a continuous gale. . . . We have been ready to start for our depot 11 miles away but outside the door of the tent it remains a scene of whirling drifts. I do not think we can hope for any better things now. We shall stick it out to the end, but we are getting weaker, of course, and the end cannot be far. It seems a pity but I do not think I can write more. . . . For God's sake, look after our people."¹

Despite the agony of his final hours, this brave man's last thoughts were of the wives and children who would wait in vain for their return.

The tent was collapsed upon the bodies of the three polar explorers and a huge cairn built over them. A cross was made of two skis and placed on top. The heroic, tragic story of Captain Robert Scott and his faithful companions had come to an end.

¹ From *Scott's Last Expedition*, Dodd, Mead and Company.

6

ANTARCTIC ADVENTURES

WHEN Amundsen and Scott finally reached and stood upon the South Pole within weeks of one another, an important milestone in the exploration of Antarctica had been passed. Their achievements aroused far greater interest than ever before in that frozen land. Now there were explorers who were anxious to see what the rest of Antarctica was like. Thousands of square miles, a whole continent, in fact, still lay hidden in mystery and waited to be explored. A new chapter in man's assault on that faraway continent was about to begin. Among the most important of the explorers who began the second assault on the land of the South Pole were Sir Douglas Mawson and Sir Ernest Shackleton. Both these adventurous men were experienced visitors to the Antarctic. The first to go was Mawson.

Mawson was a young Australian who first became fascinated by Antarctica as a member of Shackleton's expedition to that part of the world in 1909. This youthful scientist was a member of the Shackleton party which first found the location of the elusive South Magnetic Pole. Two years later, after return-

ing to his native land, Mawson had a great desire to go back to Antarctica with an expedition of his own. He was eager to make new studies in the area around the South Magnetic Pole. Above all, however, Mawson had a great urge to explore new, unknown regions of Antarctica, to map his discoveries and to make scientific observations on the weather and the nature of the land. The scientist-explorer received the sympathy and help of his government to carry out an expedition to the world's most remote continent.

An old sealing vessel, the *Aurora*, was bought by Mawson to transport his men and supplies to Antarctica. The *Aurora* was a strongly built ship which had seen many rough days in the waters of the Arctic. It was powered by sails and steam. Douglas Mawson set out on his great adventure from Hobart, Tasmania, on December 2, 1911. His first objective was the Macquarie Islands, rocky specks that lay about halfway between Antarctica and New Zealand. Mawson planned to set up a wireless station at this point so that he could relay messages from his camp on the Antarctic Continent to Australia. He was the first of the explorers to make use of wireless apparatus on the south-polar continent.

When the *Aurora* reached the Macquaries it was joined by another vessel, the *Torua*, which had carried the wireless masts and other equipment from Australia. A welcoming committee met the surprised explorers when they came ashore. A small group of shipwrecked sailors had found shelter on the barren storm-swept islands. Cold and hungry, they were overjoyed to see Mawson and his party. The stranded seamen helped to put up the wireless station and were then taken back to Australia aboard the *Torua*. Three weeks later, on December 24, Mawson had the *Aurora* pointed south for the great white Continent of Antarctica.

Up to the time of the young Australian's south-polar ad-

venture, most of the explorers had made their invasion of Antarctica in the region of the Ross Sea. Mawson planned to strike out for an entirely different part of that continent. He headed for an area that lay directly to the south of his native country of Australia. This part of Antarctica is far to the west of the Ross Sea and was first sighted from a distance by the American naval officer Lieutenant Wilkes, and the French explorer Admiral d'Urville.

By early January of 1912, Mawson and his party had pushed through the pack ice that circles much of Antarctica and slowly sailed the *Aurora* close to the icy ramparts of the continent. The expedition was searching carefully for a safe place to build their winter base. A large indentation in the cliff-like walls of ice suddenly came into view. The *Aurora* was promptly headed into this newly discovered body of water which the explorers named Commonwealth Bay. As Mawson examined the coastline, he spotted a long finger of land sticking out into the bay. A closer look at the patches where the snow and ice had melted revealed rocky terrain. This was the solid foundation Mawson wanted on which to set up camp.

Supplies, equipment and large sections of the hut which had been built in advance were unloaded. Mawson and seventeen members of his expedition also went ashore and named the point Cape Denison. This was to be the explorers' main camp. Another group of explorers under the lead of Frank Wild, who was also a good friend of Shackleton's, sailed off on the *Aurora* some 300 miles farther west to set up the expedition's second base. The two parties thus expected to explore a huge area of Antarctica.

Mawson and his companions worked smoothly and rapidly in getting their shelter up before the short south-polar summer drew to an end. Dynamite was used to blast holes in the

rock into which pilings were securely anchored. The rest of the flat-roofed hut was rigidly fastened to the piling supports. Eventually blizzards piled giant snowdrifts against the sides of the building, forming a good insulation against strong winds. In fact, the snow became so high in time that the explorers were forced to dig a tunnel leading to the door of the hut. This was the only way the men could get in or out of their shelter.

The summer had hardly ended before the Australian expedition discovered that the location they had chosen promised to be an unusually stormy one. Day after day, with hardly a break, the wind roared over their hut, sounding like a never-ending parade of speeding express trains. The men had to shout to one another inside the shelter to be heard above the shrieking wind. When the wind stopped, Mawson and his companions found their ears ringing, and they had to restrain themselves from shouting. The expedition's weather instruments, which had to be read every day, were located a short distance from the hut. But short as it was, the explorers found it hazardous to venture out during the howling wind storms. In order to get to the instruments they had to crawl on hands and knees to avoid being blown away. An attempt was made to put up the masts for the wireless set but these were blown down as easily as a row of dominoes. It wasn't until the following Antarctic summer that the expedition succeeded in getting the masts up and making wireless contact with Australia.

The weather instruments which Mawson's party used recorded an average wind velocity of more than sixty miles per hour. Very often there were gusts which were estimated as high as 200 miles per hour! It wasn't safe for a man to be outdoors during such moments. At one time the explorers saw their 300-pound tractor raised off the ground and tossed fifty

feet away as easily as a child might throw a stone. Before the winter was over Mawson and his companions gave their location a new name—"the home of the blizzards."

The vicious winter weather of screeching winds and temperatures of fifty below zero gave way in good time to the more endurable conditions of summer. When this period arrived, the expedition immediately got started on various inland journeys which had been carefully planned through the long Antarctic winter. One group was to head for the South Magnetic Pole and make a series of scientific observations. Another was to concentrate on mapping work, covering the coastline that lay to the east and west of the Cape Denison base. Mawson and two companions—Dr. Xavier Mertz, a Swiss, and Lieutenant B. E. S. Ninnis, an English army officer—were to strike out in a southeasterly direction and explore that unknown region as far as their rations would permit.

By the first week of November the weather seemed favorable enough for Mawson and his two fellow explorers to begin their trip. They took along three sleds loaded with food and camping equipment, and each sled was pulled by a fine team of Huskies. To the farewell shouts of their friends, the three explorers sped off for the glacier that rose in a gentle slope from Cape Denison to the mountainous interior.

Blessed with excellent weather and equally good snow conditions, which made it easy for the dogs to pull the sleds, the trio of adventurers made wonderful progress during the first stage of their journey. In the course of their march two new glaciers were discovered flowing down to the sea. One of these Mawson named for Mertz and the other for Ninnis. As the men reached higher altitudes and got farther inland, their route suddenly changed from one of pleasure to a deadly menace. They found themselves in an area crisscrossed by one crevasse after another—some inches wide, others many feet

across. Snow bridges were the only way to cross these bottomless ice canyons. The dogs fell through the weaker bridges several times, but the men were able to pull the animals out as they hung in their harness in empty space.

Time after time on the outward march Mawson and his companions would meet these heavily crevassed areas, which added an unwelcome change of pace to what was otherwise a monotonous march over miles and miles of frozen wasteland. When the explorers reached a point about 300 miles from their home base in mid-December, Mawson decided it was time for them to turn and head back. Before starting the return trip the men rearranged their remaining supplies and equipment in order to improve their chances of getting through the danger areas safely.

One of the sleds which had been badly damaged was abandoned. All the supplies were packed on the two remaining sleds while the extra dogs were divided between the two teams. Since Mertz was the best skier among the three men, Mawson placed him at the head of the party to break the trail and warn against crevasses. The leader of the expedition was to follow with the first sled while Ninnis was to bring up the rear. Mawson felt that a lead sled was always in greater danger of falling into a crevasse so he had the biggest share of their precious food placed on Ninnis' sled. This was the marching order of the explorers as they entered their first perilous zone.

They had covered a good stretch of this particular crevassed area when Mertz suddenly raised his ski pole in the air—a signal to stop, there was danger ahead. Both Mertz and Mawson examined the trail ahead very cautiously by jabbing their ski poles into the snow. The explorers decided that the snow bridges were strong enough to support the sleds. They shouted to Ninnis to follow slowly.

The party had not gone very far before Mawson saw Mertz running toward him, shouting and waving his arms. For the moment Mawson was confused then quickly turned his head in the direction of Ninnis. But the Lieutenant and his dogs and sled were nowhere to be seen. Mawson's heart sank as he joined his companion in the dash back along the trail. The explorers suddenly came to a huge hole in the snow which told the sad story. Ninnis, dogs and sled had fallen into a crevasse.

The men stopped a short distance from the hole while Mawson tied a rope around his waist. As Mertz held the other end, the leader crept very carefully to the edge of the opening. Mawson made sure that the snow would hold both of them before signaling to Mertz that it was safe to join him. They peered over the edge and far below in the dim gloom of the steel-blue icy cavern the men could see the faint outlines of a dog. The animal had landed on an ice shelf that protruded from the wall of the crevasse about 150 feet below the surface. The pitiful cries of the badly injured dog could just be heard by the two helpless explorers. There wasn't a sign of Ninnis or his sled. He had disappeared into black emptiness.

For several hours both Mawson and Mertz kept shouting down into the bottomless abyss hoping that their unfortunate friend would answer. The only response was silence and a cold up-draft of air. Sorrowfully, the two men realized that the situation was hopeless. Ninnis had plunged to his death into an icy tomb. Mawson read a burial service for their unlucky friend and then the two men walked slowly back to their sled, wondering now about their own suddenly perilous position.

The sled which Ninnis drove had held most of their food. The supplies that were left would last, by careful rationing, about two weeks. This was not enough to see the men through to their base about 300 miles away. Not only had Mawson

and Mertz lost most of their provisions but, equally serious, all the dog food too. Much of their camping equipment had also gone down with Ninnis. After taking stock of their position, the two men agreed that their chances of getting safely home were extremely slim. Mawson believed their only hope was to travel as fast as possible while they and the dogs were still strong. Mertz agreed.

They set off at a great pace, speeding over the icy surface in a reckless fashion. They dashed across dangerous snow bridges, driving the dogs to the limits of their strength. But the strain was too great and one by one the dogs began to collapse. The animals were destroyed and eaten. The thin, wasted bodies of the creatures, however, provided little nourishment. Once the dogs were gone, the men had to pull the sled themselves. This cut down the mileage they were able to cover in a day's march. It was also hard work and they lost strength rapidly. They needed nourishing food, which they no longer had. Mertz was the first to crack under the terrible ordeal.

During the first week in January of 1913, the Swiss adventurer collapsed several times with severe hunger pains. He was so weak that he was no longer able to do his share of the pulling. During the night of January 7, Mertz died from hunger and exhaustion. Mawson discovered the rigid body of his friend the next morning after a night of exhausted sleep.

Mawson buried Mertz under a pile of snow blocks. He put up a simple cross on the grave and then read a farewell prayer. A note was left at the scene explaining what had happened. Mawson was now alone on a bleak, icy plain still some 100 miles from his base. His food supply was increased with the few extra crumbs which had been Mertz's share of the rations. His clothes were in rags, and he suffered painfully from frostbitten hands and feet. The skin hung in ribbons from the soles of his feet so that every step shot stabbing pains

up his legs. He found some relief by smearing grease on the raw underside of his feet and binding them with pieces of cloth. With a rope around his body to pull the sled, the nearly exhausted and starved explorer plodded on his way across the snow and ice. He was determined to go on as long as there was a spark of life and an ounce of energy left in his wasted body.

Mawson had his worst experience on January 17th. For several days up to that time he had been working his way cautiously over a glacier surface cracked with many deathtrap crevasses. He had been able to get over most of these safely when he saw his way barred by a particularly wide and deep crevasse. A snow bridge linked the two sides of the icy canyon which Mawson started to crawl over with the speed of a snail. He left a good deal of slack in the rope so that he could get over first while the sled remained behind. Once he was safely over, Mawson would then pull the sled across. In this way he would not put too much weight on the fragile snow bridge.

He was about halfway across when the snow bridge suddenly fell away beneath him. As he plunged through the opening, Mawson twisted his body and desperately clawed at the edge of the ice pit. But his fall was stopped for only a second or two. The snow crumbled in his straining fingers and Mawson plunged head foremost into the bottomless pit. Suddenly he was brought to a jolting stop by the rope around his body. He looked upward and saw that the sled had jammed against the opening of the crevasse. The sled had stopped his fall. Just as soon as he recovered his wits, Mawson noticed that he was swaying sickeningly about ten feet below the rim of the crevasse. Bracing his feet against the icy wall, he began hauling himself up the rope.

Climbing out of the crevasse was a slow, ticklish job. There

was no telling when the sled might break through the edge and put an end to his struggles. As he neared the top, he swung one leg over the edge and then lunged with all the strength he had left to roll out onto the surface. But the pressure of his foot broke a big chunk of snow and ice from the rim of the crevasse and Mawson plummeted downward once again. The rope cut cruelly into his body as it jerked him to a stop for a second time.

Weak from his struggle up the rope, Mawson now almost gave up hope of ever getting out of his frigid trap. For an instant while hanging dizzily above the black abyss, the exhausted explorer thought of ending his difficulties by slashing the rope with his knife. But then his fierce courage got the better of his feelings, and he began another attempt to climb out. There was not much strength left in his body so he had to work fast. Drawing on the last reserves of his straining muscles, he began to pull himself upward. This time he came out of the crevasse feet first, and with one last mighty push rolled out onto the solid surface of snow. As a reaction to his frightful experience, he immediately lost consciousness. It was a long time before he came to and was able to put up his tent. Eventually he crept into his sleeping bag and sank into exhausted slumber.

Before continuing his march the next day, Mawson changed his tow rope into an Alpine climber's rope so that he might have a better chance of hauling himself out of crevasses should the same accident recur. He tied knots in his rope at foot-long intervals. The knots would give his hands and feet something to grab onto as he climbed upward.

On January 28, while making his slow way through a blizzard, Mawson saw a gray-looking object loom up through the curtain of snow. As he got closer, he saw that it was a cairn made of snow blocks. It had been built by members of his

party who had been out searching for their lost leader. The would-be rescuers had left a note which gave the position of the cairn and also the distance to the next depot, which was twenty-three miles away. But best of all the search party left a package of food which Mawson lost little time in opening and cooking. It was only by the greatest good luck that he had stumbled upon this lifesaving outpost.

Refreshed and given new strength by his extra food rations, Mawson struck out for the next depot at a much faster pace. He was sure now that he would get through safely. The note also explained that the *Aurora* had come back to the camp to pick up the expedition for the journey back to Australia. Mawson figured that the vessel had arrived about two weeks before and, knowing it could not stay long because of the ice, he hoped to be able to reach camp in time to get aboard. Frank Wild's party had also to be picked up, which was another reason why the *Aurora* could stay only a short time.

Within three days Mawson covered the twenty-three miles to the next depot. This was a shelter which members of his party had carved out of solid ice and which they called Aladdin's Cave. It was heavily stocked with food and to Mawson who had lived for weeks in a worn, flimsy tent, the Cave was a warm, snug retreat. The Cave was only five miles from the hut so there was no doubt in Mawson's mind now that he would reach his goal safely. After a good night's sleep and with a stomach full of nourishing food, the explorer began the last lap of his march. After an absence of more than three months he was anxious to see his companions.

The last portion of the explorer's journey lay over a glacier whose steep, slippery surface made walking hazardous. Since Mawson's crampons—steel spikes on the soles of shoes which dig into the ice and give the wearer a sure footing—had long since worn out, the icy glacier was doubly dangerous. To

make matters worse, a mighty blizzard struck with blinding fury. It was difficult for him to walk upright against the gale winds. Even when the explorer bent over double, powerful currents of air tore at his body and threatened to lift him up and blow him off the glacier. It was impossible to go on. Mawson had to return to the Cave and wait out the storm.

The blizzard's howling wind and thick falling snow kept up for a full week. Mawson became more and more impatient as the storm continued to rage. It was maddening to be a prisoner in a cave while only a few miles from the end of his march. But he was mostly worried about the *Aurora* leaving without him. Mawson was not keen about spending another winter on Antarctica, especially after the physical tortures he had been through. At last, on February 8, the wind began to die down, and he felt it was safe enough to make a run for the base. He tied the sled's towline around his body and marched down the glacier toward the hut.

As he neared the end of his long, tragic journey, Mawson spied the friendly outlines of the camp among low-lying hills of snow. But his heart sank as he searched the nearby water for a sign of the *Aurora*. There were only blocks of ice floating in the bay. The camp looked deserted too. What a heartbreaking welcome, Mawson thought. Then he saw four men running toward him. Soon they were together, greeting one another warmly and exchanging dozens of questions. As they all walked to the hut, Mawson was told that the *Aurora* had left only that morning. Four members of the expedition had elected to stay behind in the hope that their long-overdue leader would return.

Mawson quickly decided that they must try to reach the *Aurora* by radio. The expedition's vessel could only receive messages, and fortunately Mawson's call came through. The captain and other members of the exploration party were sur-

prised and happy with the news that their leader had got home safely. The *Aurora* was quickly turned around and with all possible speed was headed back to Cape Denison. As the ship neared Commonwealth Bay, a screaming hurricane churned the seas into mountainous waves. It was impossible for Captain Davis to get close to the stranded explorers. The skipper was now forced to make a painful decision. If he waited for the storm to blow itself out, it would probably be too late to reach Frank Wild and his party who were camped 300 miles to the west on an ice shelf. They were in no position to spend a second Antarctic winter in their location. Mawson and his four companions were better off in their comfortable hut even though it would be no pleasure to live through another six months of Antarctic darkness. Captain Davis decided there was only one thing for him to do and that was to hurry on to Frank Wild before the winter's ice barred his way.

Mawson agreed completely with the captain's decision when he later learned what the situation was. Ten long lonesome months passed before the *Aurora* returned to take Mawson and his four companions back to civilization. Sir Douglas Mawson—knighted later for his explorations—was going home after being away for more than two years.

Although they had met with many terrible hardships and tragedy, the Mawson Antarctic expedition had accomplished a great deal. Large unknown areas of the Adélie region of Antarctica were discovered and explored. Many miles of Antarctica's coastline, east and west of Commonwealth Bay, were mapped. New knowledge of the magnetic forces in the region of the South Magnetic Pole was obtained along with information about the rocks and sub-surface of the frozen continent. Much new Antarctic weather information was collected. This was possible for Mawson and his fellow explorers because

they had chosen one of the most changeable weather locations on Antarctica. The sum of all the scientific information which Mawson's expedition gathered added more proof to the growing belief of Antarctic experts that the land of the South Pole was a single continent and not a series of islands connected by a giant layer of ice.

Sir Douglas Mawson hadn't been home in his native Australia many months before another expedition of explorers was headed for Antarctica. This one was under the leadership of his good friend, Sir Ernest Shackleton who, ever since his first visit with Captain Robert Scott, found it hard to resist the call of the mysterious white land of the South Pole. Shackleton was on his way for a third time to the southern end of the world, home of the coldest temperatures and wildest storms. The veteran explorer had conceived an elaborate program for his latest invasion of Antarctica.

Shackleton planned to divide his expedition into two groups. One of these would land on the ice-bound continent from the Weddell Sea side and march inland. This group would head for the South Pole and then continue onward to the Beardmore Glacier and Ross Sea. The second party would go into Antarctica from the Ross Sea area and strike out for the Beardmore Glacier, setting up food depots as they went along. The expedition members advancing from the South Pole would need these stored supplies of food and fuel to complete their overland march to the sea. It was an exciting plan and surely one of the most ambitious that had yet been thought of by south-polar explorers. So much interest was aroused both in British government circles and among the public that Shackleton had little trouble getting the necessary money for his adventure.

He obtained two ships for his double-pronged invasion of Antarctica. One of these was a veteran polar ship built in

Norway which Shackleton named the *Endurance*. A vessel of 350 tons, it was powered by both sail and steam. Shackleton intended to sail on the *Endurance* for the Weddell Sea. The second ship was the *Aurora*, which he had purchased from Mawson. This vessel was scheduled to carry the Ross Sea party. By the first of August, 1914, Shackleton was ready to leave London. But World War I had broken out and Shackleton wished to offer his services to England. He was ready to cancel his expedition, if necessary.

Winston Churchill was First Lord of the Admiralty at the time and when he received Shackleton's offer, the Admiralty chief sent the explorer a one-word message in reply: "Proceed!" Churchill's go-ahead greatly eased Shackleton's mind and a week later he headed the *Endurance* out to sea. What new discoveries lay ahead? What new adventures were in store? These were some of the thoughts that filled Shackleton's mind as his ship made its slow way southward through the long green swells of the Atlantic Ocean.

Shackleton sailed a zigzag route to the Weddell Sea. A stop was first made at Buenos Aires, Argentina, for last-minute supplies and then the explorer went on to South Georgia Island. He left this British possession on December 5, 1914, and headed for the easternmost area of the Weddell Sea. This would take him close to a part of Antarctica called Coats Land. The explorer believed this offered the best route for entering deep within the unknown sea and landing on the continent.

Long before crossing the Antarctic Circle, as early as latitude 58 degrees south, Shackleton ran into an immense field of thick pack ice. If it was this bad so far north, he wondered what it must be closer to the continent. He did not like the looks of things. The *Endurance* made little headway through the obstructing field of ice, jammed and tilted in wild disorder. The vessel crawled at a speed of about one mile an hour.

Despite this handicap, they forced their way to latitude 76 degrees south. This was a record. No one had ever sailed a ship this far south in the Weddell Sea. But breaking records did not interest Shackleton very much at this time. The pack ice was becoming an increasing worry and held his complete attention.

The farther south the *Endurance* crunched its way, the heavier the pack ice became. The ship was barely able to inch its way forward. Finally, on January 20, 1915, the pack proved too thick and brought the ship to a dead stop. Even though it was summer in the Antarctic, the open water trail left by the *Endurance* froze quickly into a solid sheet of ice. Shackleton no longer thought of trying to reach the Antarctic coast. His main idea now was to get out of the ice which held the *Endurance* in a deadly grip.

Not too far from the ship were several open water leads which, if they could be reached, meant escaping from the deathlike hold of the ice. For a week the men aboard the *Endurance* worked furiously with saws and axes in an effort to cut a channel to the ice-free water. But it was no use. As fast as they cut the ice loose, the water would freeze again or the channel would be closed by the constant movement of the pack. Shackleton realized the hopelessness of their efforts and ordered the men to stop. There would be no escape. The *Endurance* was firmly locked in the ice and would have to drift helplessly along with the field.

There was not much for the men to do as they prepared to wait out the long, dark Antarctic winter aboard their ship. They were far from the coast and every day were drifting farther and farther away with the movement of the pack ice. There was little chance of carrying out scientific work. To break up the monotony of the daily routine, the Husky dogs would sometimes be taken out onto the ice and the men would drive off on short sled journeys. A good deal of rivalry sprang

up among the various dog drivers as to who had the faster team. To the great delight of everyone, races were frequently held over a smooth stretch of ice. The explorers bet chocolate and tobacco on their favorite teams.

The dogs, too, enjoyed the races and over-the-ice sled trips. The long, cooped-up existence on the *Endurance* had become a torture for them. The animals needed action in order to remain healthy and happy. Throughout most of the south-polar night the dogs were chained out on the ice which they much preferred to the ship. To protect the dogs from polar blizzards, the explorers built shelters out of blocks of snow and called these "dogloos."

Month after weary month went by as another Antarctic spring and summer slowly approached. With the coming of milder weather the hopes of Shackleton and his men began to rise. Soon they would be able to escape from their icy prison. By October of 1915, however, the hopes of the expedition turned to despair. Wind and warmer temperatures set the ice pack into frenzied motion. Massive blocks of ice churned and rumbled around with destructive force. The *Endurance* was caught in the midst of this mad upheaval. The pressure and motion of the rampaging ice placed a terrible strain on the ship's timbers.

Cabin doors could not be closed as doorways were twisted out of shape. Decks buckled into hills and dales which made walking difficult. At night, as the men lay in their bunks, they could hear the groans of heavy timbers being wrenched and splintered by the brute force of the ice pressure. No one spoke of it openly, but all knew in their minds that the *Endurance* was doomed. The ship was being slowly crushed to death.

Day after day the *Endurance* bravely resisted the overwhelming power of the ice, but the ordeal proved too much. Soon the seams opened in the vessel's twisted hull and water

began to pour in. The pumps were worked night and day by every man on board, including Shackleton, to fight back the intruding sea. But the desperate battle was useless. On October 27, Shackleton had to admit that the *Endurance* was defeated by the ice and ordered all hands to get ready to abandon the ship.

Immense blocks of ice, tumbling and heaving against one another, formed a giant pressure ridge that crept closer and closer to the *Endurance*. Slowly but surely the oncoming ice wave reached the ship and heaved it to the peak of the ridge as though it were a toy. Part of the ship's stern was torn away by this violent movement. The men worked feverishly now to get the dogs and the most important equipment and supplies overboard and onto the ice. They made a chute out of canvas and slid the dogs down to the floe. By evening the salvaging job was done and the members of the expedition gathered for their last meal aboard the *Endurance*. The explorers had a hard time keeping their food on the table because of the sharp angle at which the ship was tilted.

Very few words were spoken. Everyone realized that the loss of the *Endurance* placed their lives in great peril. One of the crew members made a final tour below deck and saw the water rising steadily. Here and there dagger-sharp spears of ice had cut through the thick sides of the ship. Finally, everyone but Shackleton left the vessel. The expedition's leader had one more chore to perform. He hoisted a small blue flag as his farewell to a brave ship while his companions on the ice gave three rousing cheers.

Shackleton had estimated that since the *Endurance* first became frozen in the pack, nine months earlier, they had drifted with the ice more than 570 miles in a northwesterly direction. The ship's charts showed that they were about 340 miles from Paulet Island where Shackleton knew food and

protection from the weather could be found. Whalers sometimes stopped at this Antarctic outpost. The explorer told his men that they would try to reach that island. It was a daring plan and it contradicted the nickname "Cautious Jack," as Shackleton was known to many of his friends. It would be no easy march across the dangerous pack. But with courage and patience, Shackleton assured his men, Paulet Island could be reached. Cheered by the brave words of their leader, the explorers prepared for the trek across the ice.

Shackleton ordered the *Endurance's* three lifeboats to be taken along because he expected to meet many stretches of open water. The largest of these was a twenty-two-foot whaleboat called the *James Caird*. The others, much smaller, were the *Dudley Docker* and the *Stancomb-Wills*. The boats were tied onto sleds and hauled by the Huskies. The ice surface over which the explorers intended to march was not smooth like that of a skating rink. Blocks of ice, of all sizes and tilted at crazy angles, made the ice field one continuous obstacle course. With the help of axes and shovels, an advance party tried cutting a path through these ice blocks so that the boats might be hauled along.

The twenty-eight explorers had not gone much more than a mile before Shackleton called a halt. Crawling over the uneven blocks of ice with their heavy loads was proving impractical. The leader decided to pitch camp until the ice movement made the way a little smoother. A large, level place was selected where the ice seemed solid enough to hold the men and supplies. The tents were put up and the camp made as comfortable as possible. The explorers called this tiny settlement Ocean Camp.

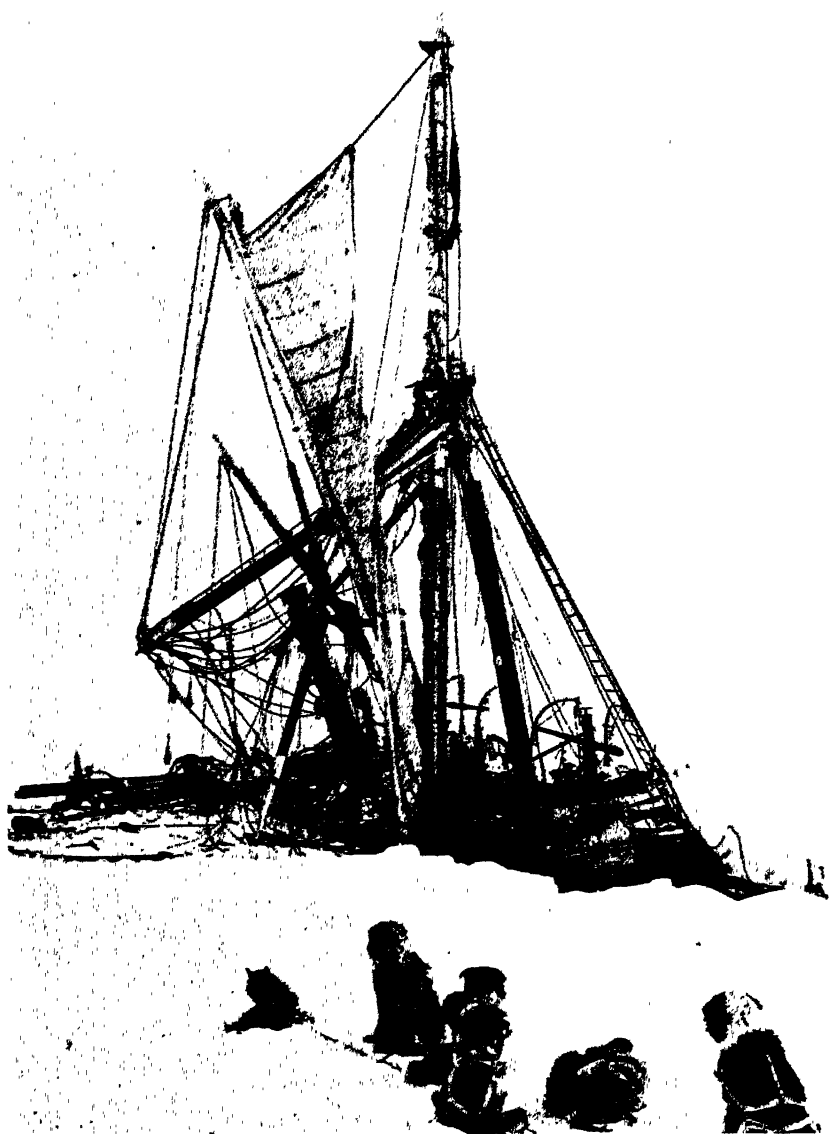
Since their stay might be a long one, Shackleton sent several teams of men back to the *Endurance* to see if they could salvage more food and anything else of value. After hacking

holes through the deck of the stricken ship, the salvage crews managed to procure a number of cases of vegetables, sugar and flour with boat hooks. They also collected precious pieces of wood, canvas and rope with which to make their camp more secure and livable.

From Ocean Camp, Shackleton and his men watched the *Endurance* go through her last death struggles. The end came on November 21, 1915. In order to get a better view of the ship's final moments, the men climbed up several nearby giant floes. The ice which had so long held the ship in a viselike grip relaxed its pressure briefly. The sudden release sent the *Endurance* nose first into the frigid water. The ship's stern rose high in the air as it slipped easily and swiftly into the sea. The pack ice then closed over the opening to seal the *Endurance's* watery tomb. "She's gone, boys," were Shackleton's sad parting words.

The explorers remained at Ocean Camp for about a month when Shackleton decided they would make another attempt to reach Paulet Island. Because their route was expected to be difficult and dangerous, the men agreed that traveling as lightly as possible would increase the chances of reaching safety. Only food, necessary camping and navigational equipment were to be taken along. Books, extra clothing and other personal belongings had to be left behind. Eager to be on the move once more, they broke camp on December 23rd. Dogs and men strained in the harnesses as they pulled the sleds loaded with supplies and the three boats.

For a week Shackleton's men made their way painfully over the icy hummocks. At the end of that time they had covered a distance of only seven miles. It was no use. The combination of massive blocks of ice that barred their path and the heavy boats proved too much. Shackleton ordered another camp to be made. This time, however, he decided



Library of Congress

Shackleton's *Endurance* crushed in the ice.

that they would use an ice floe as a base and let the current of the sea carry them to their goal. They called their new living quarters Patience Camp.

For three and a half months they lived on a giant ice floe. Like a rudderless ship, they drifted slowly with the rest of the field toward the open water of the Weddell Sea. Food disappeared rapidly during their encampment and if it had not been for the seals and penguins which the men hunted, they would have starved. Even some of the dogs were killed to add to the food supply. But food was not the only problem. They were also in constant danger of seeing their ice raft break up under them and pitch them into the water.

The Antarctic summer was now under way and the ice often became soft and slushy. One night a member of the expedition felt the ice suddenly open beneath him. His shouts for help brought Shackleton, who managed to pull the man from a watery grave just in time. The Boss, as the men fondly called their leader, was himself in danger another time when a small piece of the main floe broke loose and carried him away. Deadly killer whales followed the bobbing floe and threatened at any moment to topple Shackleton into the sea. A boat was hurriedly launched by several of his companions who rowed swiftly after the floe to rescue their leader.

The climax of the explorers' perils occurred one day when two giant icebergs plowed their way relentlessly through the pack and headed for Patience Camp. The huge bergs, with the weight and power of eighty battleships, pushed large floes aside as though they were peanuts and crunched others into small pieces. There was nothing the explorers could do except grab what possessions they could and pray that the charging monsters would stop or move off elsewhere. At the last moment, when all seemed lost, the massive icebergs were diverted from their course by a powerful sea current beneath the ice.

As the Patience Camp floe carried the stranded explorers on their northward journey, more and more open water ap-

peared. The sea swells caused the ice-flow raft to heave alarmingly. The men remained constantly alert, hoping to launch the boats at the first sign of a break in the floe. Shackleton, who from time to time had been checking the expedition's position, found that the current had carried them steadily away from Paulet Island instead of toward it. Rather than try to make for that island now, the Boss decided they would attempt to reach Deception Island. He knew that whalers often visited this island too, so there would be a good chance of being rescued.

Since the ice beneath Patience Camp threatened to break up at any moment, Shackleton had the boats filled with as much food and camping equipment as they could hold. The explorers were in enough open water now to travel the rest of the way with their boats. They left their ice raft just in time. While loading the boats, the floe split in two. There was no need to tell the anxious men to hurry.

Led by Shackleton in the *James Caird*, the three boats threaded their way cautiously through the broken ice field. Sails and oars were used to propel the vessels northward. At the end of each day's run, a large ice floe was selected on which the boats were hauled and a camp made. Here the weary men were able to thaw their frozen bodies a little and enjoy some warm food.

On April 13, the tiny fleet broke clear of the pack ice. At this point Shackleton once again changed his mind and decided it would be less dangerous if they headed for Elephant Island. This haven was 100 miles distant. The course was checked and the boats swung in the proper direction. They were not many hours along the way before they ran into rough seas and violent winds.

Gale winds churned up angry waves which constantly threatened to sweep into the overloaded boats. Rain squalls

and snow soaked the men to the skin. Frostbite and thirst added to the horrible sufferings of the explorers. They tried chewing on raw hunks of seal meat to satisfy their hunger but found little relief. The salty flavor of the meat only increased their thirst and discomfort. Finally, on April 15, their torment ended when the explorers sighted the shore of Elephant Island. More dead than alive, Shackleton and his companions could hardly move their legs to wade through the surf to reach the beach.

The explorers were delirious with happiness and relief to be on solid land once more. Some of the men scooped up the pebbly sand and let it trickle through their fingers like a miser with his gold. They had been through a frightful experience and were thankful to have escaped with their lives. But they were not out of danger yet. Elephant Island was far off the beaten track, even for whalers, and without a wireless set to call for help they might never be found. There was one last chance which Shackleton decided to risk. He would have to sail off in one of the small boats in search of help.

After discussing several plans with his staff, he decided to make a run in the *James Caird* to South Georgia, about 800 miles to the north. A whaling station was located on this island and was connected by wireless to civilization. Although the *Caird* was a sturdy boat, as it had proved on the trip to Elephant Island, it was pitifully small to buck the wild Antarctic seas that had to be crossed. But the gamble was necessary if the explorers were ever to see their homeland again.

The expedition's carpenter immediately began to make the *Caird* more seaworthy. The keel was strengthened by a mast from one of the smaller boats. A deck was placed over the front of the boat with sled runners and canvas. This provided a shelter where the crew might crawl for protection during



Royal Geographical Society

Shackleton and companions aboard *James Caird* nearing South Georgia.

bad weather. A new mast and sail were added and about a ton of rock ballast put aboard so the boat would ride steady in rough water. Shackleton chose five men to sail the *Caird* with him on the daring voyage. On April 24, 1916, a blue sky and bright sun replaced the gray, storm-torn clouds which had hovered over the explorers for weeks. The sun was like a shiny symbol of hopeful promise as they put out to sea. Their shore-bound comrades sent them off with shouts of farewell.

The sunny day which the explorers enjoyed on their de-

parture proved to be one of the rare few of the entire journey. As Shackleton had expected, they were battered by one violent storm after another. Spray and cold combined to coat the boat with ice. This added enormously to its weight and threatened to swamp the fragile craft. At the risk of their lives the men took turns climbing out on the makeshift deck to chop the ice away. Their clothing was seldom dry. Wet through by spray and rain, their clothes often froze as hard as steel plate. The constant wetness and cold caused painful body sores and chilled them to the bone. This daring voyage took place in the biting cold of an Antarctic winter when temperatures rarely rose above zero. Warm "hoosh" and milk (powdered milk poured into boiling water) helped them to endure their sufferings. The men cooked their life-giving meals on a small alcohol stove in the bottom of the boat.

Day after day the *Caird* bucked like an angry bronco as the explorers pushed farther and farther through the stormy Antarctic sea. The men were ever fearful that one of the giant waves which they were always battling would close in on them and send the *Caird* to the bottom. One night while Shackleton was at the tiller, he saw a wave form which, he was sure, was about to put an end to all their troubles. "During twenty-six years' experience of the ocean in all its moods, I had never seen a wave so gigantic," he wrote. As the mountainous wall of water bore down upon the helpless explorers, Shackleton shouted to his companions, "For God's sake, hold on! It's got us!" The *Caird* was raised aloft at a sharp angle and then flung forward into a boiling mass of water as though it were a cork. For one frightful moment the men thought the end had come as their little boat staggered under the terrific blow. Water poured over her sides in great torrents and the weight made the *Caird* sink alarmingly. The men grabbed any sort of a container they could get their hands on and bailed with des-

perate fury. For ten long minutes they fought the intrushing water until they felt the sturdy little *Caird* respond lightly to the tiller once more.

After a little more than two weeks of hair-raising adventures and extreme physical suffering, Shackleton and his companions finally landed on South Georgia. They were exhausted but overjoyed that they had sailed safely across 800 miles of one of the world's stormiest seas. The explorers had made an epic sea voyage. But there was no time for self-congratulations. Their job was not finished. They had to reach Stromness Whaling Station on the opposite side of the island. The *Caird* was no longer seaworthy so any idea of using it further had to be given up. There was only one thing left to do and that was to reach the station by foot. This meant marching overland through a region never before seen by man. Indeed, the interior of South Georgia was filled with so many jagged, high mountains—10,000 feet and more—as well as dangerous glaciers, that it was said to be impassable.

But these were desperate men determined to get help for their stranded comrades regardless of any obstacles. After resting a while to recover some of their strength, Shackleton and two of the crew, Worsley and Crean, set out for the whaling station. They took along enough food to last three days, an axe, compass and about 100 feet of rope. They did not wish to burden themselves with too much equipment since they were determined to hike with all possible speed.

One mountain ridge after another blocked their path, but they crossed them slowly and painfully. When the men finally reached the last of these ridges it dropped suddenly and steeply to a lower level. It was impossible for them to go down the sides of the cliff. Their hearts sank. It looked as though they had reached the end of the trail and would have to crawl back to their starting point. Suddenly one of the men

spied a nearby glacier. As Shackleton and his companions made their way to this icy pathway, they saw at once that it was too steep to walk upon with safety. They decided to use an alpine climbing trick—dangerous and difficult—to get down the slippery incline. They would use the rope to make a crude toboggan and slide down the glacier. Mountain climbers call this method a “glissade.” But they had to hurry since darkness would add to the hazards of their glacier slide—an unseen rock and it would be death for all three. The rope was coiled in such a way that it formed three pads. The men seated themselves upon these pads, with Shackleton in the lead. They straddled one another’s waist with their legs and took a firm hold of each other’s clothing. Then Shackleton shoved them on their way. For a moment they felt as though they had shot off into space. Faster and faster down the icy slope they sped. Forgetting the danger as the ride became more thrilling, the men began to shout out of sheer excitement. They ended their glacier slide in a soft snow bank, laughing and relieved that they were still in one piece. After that spine-tingling ride Shackleton and his companions rested until dawn. They resumed their journey then and before long approached a tiny cluster of dirty shacks—Stromness Whaling Station. A deep-sounding blast of a whistle, calling whalers to work, broke the morning quiet. This was the first sound of civilization the explorers had heard since leaving England. They quickened their steps and headed for the office of the station’s manager.

The boss of the whaling operations stared in speechless wonder at his unannounced visitors. With their long, uncombed beards and ragged clothing the explorers looked like “unpleasant ruffians,” as Shackleton described their appearance.

“Who are you?” the astonished manager asked.

“Ernest Shackleton,” was the friendly answer. And then the

explorer told the tragic story of his expedition and the urgent need for help. His surprise giving way to eager helpfulness, the manager called the station's crew together and quickly began preparations for the rescue of the stranded explorers.

First, the men who had been left on the other side of South Georgia Island were picked up and cared for. Then Shackleton made arrangements with the whalers to charter their ship, the *Southern Cross*, for the trip to Elephant Island. But after sailing within seventy miles of their goal, the rescue attempt had to be given up because of the heavy pack ice. Disappointed, Shackleton turned north and made for the Falkland Islands where he sent an urgent call for help to the British Admiralty in London. But England was now in the midst of her war with Germany, and the government told Shackleton that a relief ship could not be sent for four months.

Of course, the explorer's men on Elephant Island would not be able to wait that long so Shackleton sent an appeal to the nearby countries of South America. Uruguay loaned him a trawler, *Instituto de Pesca No. 1*, which carried Shackleton to within twenty miles of Elephant Island before the pack ice forced him to give up once more. A third rescue attempt was made and still a fourth. This one finally succeeded. On the last try, Shackleton used two Chilean boats, the *Emma* and the *Yelcho*. By a stroke of good fortune the ice parted as the rescuers neared the island and the stranded explorers were removed. Shackleton reached his comrades just in time. They had suffered fearfully from cold and hunger. By August of 1916 their food was almost gone and with their second Antarctic winter well advanced, the men could not have survived many more weeks.

The other half of Shackleton's South Pole expedition, the Ross Sea party, went through adventures equally as perilous. A group of men from the *Aurora* was left stranded on the ice-

bound continent after a storm blew their ship out to sea and all but wrecked it. They had to live through an Antarctic winter as best they could with little food and inadequate clothing. The *Aurora*, meanwhile, had to limp off to Australia for repairs before it could come back the following spring to rescue the survivors.

Although Shackleton's expedition had ended in disaster, it did not discourage him from thinking of a fourth visit to the south-polar continent. He planned a small-scale invasion this time that would attempt to map the shore of Coats Land in the Weddell Sea and Enderby Land farther east. Shackleton left England aboard the *Quest* in 1921 and headed south. But fate once again stepped in to spoil his plans. As his ship lay anchored offshore from Grytviken, one of several whaling stations on South Georgia Island, Shackleton, worn out, perhaps, by his many Antarctic hardships, suffered a heart attack during the morning of January 5, 1922, and died. This brave man whose whole life was dedicated to exploration was buried at Grytviken. His resting place, marked by a rock cairn and cross, is near Antarctica, whose frozen mysteries had fascinated him for a lifetime.

7

BYRD CONQUERS ANTARCTICA

FOR MORE than ten years after Shackleton's disastrous Antarctic expedition of 1914-16, there were no large, organized attempts to explore that ice-bound continent. From time to time during this period there were only scattered visits, mostly by whaling ships. Very little new information was uncovered about Antarctica. Then, in 1929, a new era in Antarctic exploration began. Explorers with modern-day equipment, such as airplanes, radio and motorized vehicles, came down to Antarctica in a fresh attempt to unlock more of its frozen secrets. This parade of modern south-polar explorers was led by Sir Hubert Wilkins, an Australian.

Wilkins was the first to bring an airplane to Antarctica and use it for exploration work. He made his pioneering flights in 1928 and 1929, flying over many new and unseen portions of the Palmer Peninsula. Unlike the aircraft of later explorers, Wilkins' plane was fitted with pontoons. The plane was put over the side of the mother ship, and it could only take off and land on water. Because of this handicap, Wilkins could never make long flights over the frozen wasteland. Although



Sir Hubert Wilkins, American Geographical Society

Wilkins' seaplane *Los Angeles* about to start on survey flight.

limited in his aerial explorations, he managed to map many new portions of the peninsula.

Of all the modern south-polar explorers, none has been able to equal the deeds or fame of the American naval officer, Rear Admiral Richard Evelyn Byrd. In his youth, Byrd had read with fascination the heroic stories of the old-time Antarctic explorers. He dreamed of someday visiting that isolated world of ice and snow and making new discoveries of his own. Before he was to fulfill that ambition, however, Byrd acquired fame with several other accomplishments. One of these was an airplane flight over the North Pole—the first made by man—on May 9, 1926. Byrd's second achievement was an airplane flight across the Atlantic Ocean, which he made with three

companions on June 29, 1927. At that time the airplane was not as efficient as it is today, and a flight of more than 3,000 miles over an ocean was considered quite an accomplishment.

It was at a dinner party in Norway celebrating his historic flight over the North Pole that Byrd first made known his plans about visiting Antarctica. Amundsen, the great polar explorer, was present and asked Byrd what he was thinking of doing next. Byrd replied, "The South Pole." From that moment on, Amundsen gave Byrd constant encouragement for carrying out his Antarctic expedition. Later, when Byrd got down to the real work of organizing his expedition, Amundsen was an endless source of advice about the right kind of ship, the best type of cold-weather clothing and food supplies.

In 1928 Byrd felt that he was ready to begin his great Antarctic adventure. His major goal was to fly over the South Pole. But Byrd also planned to do a great deal of exploring by airplane and dog team. In addition, studies would be made of the Antarctic weather and the rocky surface of the frozen continent. This last study, geology, would help to give mankind a little more knowledge of the history of Antarctica. Admiral Byrd's Antarctic plans were ambitious, and he knew that his expedition would have to be large and thoroughly equipped.

Byrd bought two ships to carry his men and supplies to the south-polar continent. One of these was the *City of New York*, an old Norwegian sealing vessel, which he bought on the advice of Amundsen. The *City of New York* was 170 feet long and thirty-one feet wide. Powered by steam and sail, the *City of New York* had been especially built to sail through ice-filled waters. Her sides were thirty-four inches thick, and her hull was shaped in such a way that when squeezed by ice floes the vessel would rise upward as the ice slid harmlessly underneath. Byrd had his quarters aboard this ship.

The second vessel was a small steam freighter which he named *Eleanor Bolling*, after his mother. This was a steel-hulled ship, although Byrd was warned about the dangers of taking a boat of this kind through the pack ice. Steel plates were not supposed to stand the ramming force of knife-sharp ice floes as well as heavy timber. But with luck and care, Byrd was confident that the steel-hulled *Bolling* could be sailed safely to Antarctica. He planned to put most of the expedition's cargo aboard this ship.

To carry out his aerial explorations on Antarctica, Byrd took along a sturdy three-engine Ford monoplane, a Fokker monoplane and a small Fairchild aircraft. The Ford plane was named the *Floyd Bennett*, after the famous airman who had been Byrd's companion on the North Pole flight. Bennett died shortly after that exploit; otherwise he would have been a member of the expedition.

The dog teams consisted of seventy-nine Greenland Huskies and sixteen Chinooks. There was also a motorized vehicle, called the Snow Cruiser, which was specially built by the Ford Company for Byrd's use. The giant machine weighed twenty-nine tons and had tires ten feet in diameter. Driven by a powerful engine, the cruiser pulled heavily loaded sleds.

After weeks of frantic work getting supplies and equipment aboard his ships, Byrd's Antarctic expedition of eighty-three men finally got under way on August 25, 1928, when the *City of New York* left Hoboken, New Jersey. A month later the *Eleanor Bolling* pulled up anchor at Norfolk, Virginia, and headed south. The two ships sailed for New Zealand where more supplies were brought aboard, and on December 2, 1928, both vessels set out for the south-polar continent.

As the little fleet approached the pack ice at the entrance to the Ross Sea, they met the whaling ship, *Larsen*. Byrd had made arrangements beforehand with the skipper of this boat

to tow the little *City of New York* through the pack and thus save her precious coal supply. A line was thrown from the powerful whaling ship, and soon the three ships were making their way through the ice. The *Eleanor Bolling*, under its own power, followed behind the *City of New York* and was kept in the clear water lane that had been formed. All three vessels got through the ice safely and then Byrd had to decide which of two areas he was going to use for establishing his base.

He sailed first to Discovery Inlet, where Scott had based his expedition, but found the region unsuitable for basing and flying his airplanes. Then he went to the Bay of Whales, which Amundsen had suggested. Byrd liked what he saw. There were no mountains nearby to interfere with the take-offs and landings of the planes. At the same time the expedition would be closer to thousands of square miles of territory which had never before been seen by human eyes. This made it ideal for exploring activities. The two ships were anchored against the clifflike face of the Ross Ice Barrier and made ready for the unloading job. Admiral Byrd, meanwhile, together with several other members of the expedition, went ashore with two dog teams to look for a good camp site.

At first Byrd thought they might find Amundsen's old camp at Framheim. But after seventeen years of Antarctic blizzards, Amundsen's huts were deeply buried under snow and could not be found. Byrd then traveled about eight miles farther inland. There he found an ideal area for his camp. There was lots of level space nearby from which the planes could take off. But, most important, the site was far enough back from the edge of the Barrier so that there was no danger of the base sliding into the sea if the shelf ice collapsed. The explorers hurried back to the ships, and the job of unloading supplies and equipment was begun.

Admiral Byrd knew that anchoring ships against the face

of the Barrier was extremely dangerous. It was impossible to tell when the massive ice cliff would crack and send thousands of tons of ice plunging into the sea. If a ship were ever caught in one of these ice slides, it would be crushed. But there was no other way to unload the vessels, so the chance had to be taken. For this reason the men worked at top speed to cart the supplies inland just as fast as they were brought out of the ships' holds. The dogs, divided into ten teams, proved to be wonderful assistants. Lumber, food, supplies, in fact almost everything that had been unloaded from the ships, was hauled to the camp site by the dog teams. These spirited work dogs were tireless in their labors. It was not unusual for them to transport as much as eight tons a day.

Fear of the Barrier breaking loose and crushing his ships was always present in Byrd's mind. One day, near the end of the unloading activity, it very nearly happened. Byrd was in his cabin aboard the *City of New York* when he suddenly felt the ship quiver from a powerful blow. This was followed by a series of strong shocks and then a gigantic roar. The *City* tilted over on its side at an alarming angle, and Byrd thought that it was about to capsize.

He managed to get his cabin door open and rush out on deck. He was shocked by the sight that met his eyes. The *Bolling*, tied to the *City*, had tipped over on its side so far that its keel was out of water. Byrd saw at a glance that the Barrier had collapsed. Tons of ice had broken away from the edge where the supplies had been landed and had fallen upon the *Bolling's* starboard deck. By sheer good luck, the little cargo ship had missed the main portion of the ice slide, otherwise it would have turned turtle. The *City of New York*, although listing badly herself and tied to the *Bolling*, prevented the steel freighter from capsizing completely. Fortunately, no one was killed or injured by the accident, although several

men were thrown into the icy water. Quick work on the part of their companions saved them from drowning. Both ships righted themselves quickly and luckily suffered little damage.

Just as soon as all the food, building supplies and exploring equipment were brought ashore, the *Bolling* and the *City of New York* tossed off their lines and quickly headed for New Zealand. The Antarctic winter was approaching swiftly, and there was no intention of letting the two ships get caught in the pack ice. Admiral Byrd and forty-two members of his expedition were now alone on the ice-bound continent. For about two months they were busy erecting buildings and making the camp comfortable for the coming long winter.

The explorers also made what preparations they could, while the weather was still favorable, for next season's aerial and ground-exploring activities. This consisted mostly of setting up food and fuel depots and marking inland trails with flags. Byrd even managed to make several short exploration flights in the Fairchild plane. These led to his first discovery—a chain of mountains which he named after one of the financial backers of his expedition, Rockefeller Range.

Admiral Byrd's camp, called Little America as a reminder of the explorers' homeland, was the largest settlement that had yet been made on Antarctica. There was an office building where the affairs of the expedition were carried on, living quarters with bunks and mess hall for the men, several shops where the scientific and mechanical work of the expedition was performed and even a gymnasium where the men could keep in good physical shape as well as have fun. All the buildings were of the prefabricated type. The walls, partitions, roof and other sections were made beforehand so that all the men had to do at the camp site was to bolt them securely together.

The buildings were as weatherproof as it was possible to make them. The walls were four inches thick and were built

up with several layers of wood, building paper and insulating material. The structures were sunk deep in the snow for additional protection against gale winds. The explorers dug tunnels beneath the deep snow connecting all the buildings of the camp. Thus it wasn't necessary to go outdoors in bad weather to visit various huts. A shelter for the dogs was also carved out underground which the men called "dog-town."

Sixty-foot steel masts towered over the camp. These supported the radio antennae and permitted the expedition to remain in constant touch with the outside world. There were also towers with propellers at the top. Spun by continuous

Germ-free snow when melted provides Little America with fresh water.

U.S. Navy



winds, the propellers helped to power the generators. These supplied the camp with electricity for lighting purposes and for operating the radio. When the camp site was visited in 1955, one of the propellers was found still spinning! It was removed and given to Admiral Byrd as a souvenir.

The expedition's airplanes were protected for the winter by shelters made of snow blocks. Only two planes had to be covered in this manner. After a flight to Rockefeller Range one day by several of the expedition's scientists, a gale suddenly arose and wrecked the Fokker plane.

In the Antarctic, March 21 is considered the start of the six-months season of night. By this time the sun rises and sets along a path close to the horizon and daylight hours become shorter and shorter. On April 19, Byrd and his men saw the sun for the last time. The short daylight hours were now more like twilight and this gradually faded into twenty-four hours of darkness.

During leisure moments the men read books from a well-stocked library or played cards. Poker was the most popular game. In place of money, players bet cigarettes which had far more value in this desolate outpost. The steady winners would eventually have to share their spoils with the losers in order to keep the games in progress. On Sundays, the traditional day of rest, motion pictures were shown in the mess hall. Old Charlie Chaplin films were the favorite of the men. On week ends the explorers listened to radio broadcasts from the United States and New Zealand. Arrangements had been made with outside radio stations to beam their signals to Antarctica at that time. Thus the expedition was kept informed of happenings at home as well as in other parts of the world.

About once a week the gym, a twenty-five-by-fifteen-foot room, became a favorite gathering place. Boxing matches were the attraction. These were arranged by Bernt Balchen,



U.S. Navy

a skilled flyer and expert amateur boxer. Although the temperature in the gym often fell to 50 degrees below zero, the men did not seem to mind as they shouted and clapped encouragement for their favorite boxer. On the more serious side, lectures on scientific subjects were given twice weekly. Some of the subjects were geology, radio and meteorology.

The day's activities at Little America came to an end at ten o'clock at night when all lights were put out. Those who wished to read in their bunks after curfew had to do so by candlelight.

The weather experts kept a daily watch on their wind and

temperature instruments. Extending from the room in which the scientists worked was a small, closet-like area. This was called the balloon station. It had a removable panel in the ceiling so the meteorologists could launch their weather balloons and study their flight without going outdoors. The coldest temperature recorded at Little America during the winter of 1929 was minus 71 degrees Fahrenheit. Since the days of the first Little America base, scientists have found the average temperature in the region to be 11 degrees below zero. As for Admiral Byrd, he and his close assistants spent countless hours giving careful thought to their plans for the next season's exploration work. One way or another the explorers' time was occupied and before they knew it the sun came back in August. Outdoor activities were started immediately.

Preparations for several inland sled trips were started. Geologists wished to make a study of several glaciers near the Polar Plateau. But the main goal of Byrd's expedition was the flight over the South Pole. Most of the work at Little America during the Antarctic spring was devoted to preparations for that flight. Byrd intended to use the Ford trimotor plane for his aerial journey and mechanics spent hours tuning the craft's motors with special care.

Although the *Floyd Bennett* could fly a long distance, it was not able to travel non-stop to the South Pole and back to Little America. This was a distance of a little over 1,600 miles. It was necessary, therefore, to place a fuel depot near the foot of the Polar Plateau where Byrd and his crew would have to land and refuel their plane in order to return safely. A sled party went out to establish the fuel depot long before the aerial explorers took off.

The fact that it was necessary to take along enough food to last at least a month, plus emergency camping and marching equipment, cut into the amount of fuel which the plane

could carry. If a forced landing had to be made anywhere along the route, the flyers would have a long, hard road to walk back to Little America. When fully loaded, there was barely enough room aboard the *Floyd Bennett* for the men.

For his crew, Byrd selected pilot Bernt Balchen, radio operator—relief pilot Harold June and Captain McKinley, who was to be cameraman. By November everything was ready for the take-off. All that was needed was good weather. On Thanksgiving Day, the 28th, there was a clear sky and bright sunshine. Knowing how rapidly Antarctic weather can change, Byrd and his companions climbed into the Ford trimotor, spun the plane around on its skis into the wind and opened the throttles wide. With all three motors roaring at full power, the *Floyd Bennett* sped along the smooth snow runway, then slowly, with nose tilted upward, began climbing into the sky. This was one of the tense moments of the flight. The explorers did not know whether their plane could get off the ground safely with its load of seven and a half tons. But after a run of thirty seconds it did. As the plane rose higher and higher, Little America became a tiny cluster of black specks on the white snow.

Byrd had mapped a route that roughly followed the one Amundsen had blazed on the ground. This ran across the Barrier to the Queen Maud Range, on through one of the glacier passes to the Polar Plateau, more than 10,000 feet high, finally over this frozen wasteland to the Pole. Byrd could not help but think of Amundsen as he flew through the Antarctic sky and picture how different were their methods of reaching the South Pole. The Norwegian had used dogs and sleds, making about twenty-five miles a day over snow and ice and dangerous crevasses, while Byrd was in an airplane high over the frozen continent and covering ninety miles an hour.

One of the big problems of the flyers was to get safely

over the Queen Maud mountains. These towered thousands of feet into the sky, far higher than the heavily loaded *Floyd Bennett* could fly. Byrd and his companions had two choices as they drew closer to the "Hump," as they called the mountain barrier. Both were glacier passes, the Axel Heiberg Glacier, which Amundsen and his men had climbed, and the Liv Glacier. The men did not know which pass was wide enough for the plane's outstretched wings to clear safely. There was not much time for decision as the Ford trimotor sped nearer the obstacle.

Byrd was up in the front cockpit with Balchen, straining to see the route that lay ahead as the jagged mountain peaks loomed larger and larger. They could barely see the Heiberg Glacier pass. Low-flowing clouds and fog hid the lofty ranges on either side. There was nothing else to do but head for the Liv Glacier and hope for the best. Balchen coaxed the *Floyd Bennett* to its topmost limits. Since the pass was widest at the top, it would be much safer if the flyers could get their plane up as high as possible.

Balchen had the motors roaring at full power but he could not get the *Floyd Bennett* to climb higher. As they flew swiftly into the pass, the flyers saw at once that they would have to gain more altitude. The black sides of the mountain peaks and the surface of the glacier were uncomfortably close. They were in danger of crashing. Although he knew it was precious, Byrd ordered a 125-pound bag of food thrown overboard. The nose of the plane tilted upward. But it wasn't enough. The top of the glacier lay close ahead. Another bag of emergency rations was tossed out. The *Floyd Bennett*, now responding more easily to Balchen's urgings, shot upward and out onto the Polar Plateau.

They breathed easier as they sped over the desert-like snowy surface toward the Pole. They were about 1,400 feet above

the plateau and 11,000 feet above sea level. Byrd, using his sun compass and navigation charts, checked their position continuously.

Finally he announced that, according to his calculations, they were passing over the South Pole. The Americans were at the bottom of the world, 90 degrees of latitude. At one moment, as they neared the Pole, they were speeding south; the next moment, while flying over this imaginary point, they were heading north. From the South Pole all geographical points are north.

They circled the area of the Pole. It was just like the rest of the flat, monotonous Plateau they had been flying over. Admiral Byrd dropped a small American flag weighted with a stone from the grave of his dear friend, Floyd Bennett. To honor the achievements of Amundsen and Scott, he also threw overboard the flags of Norway and Great Britain. Then he had Harold June send a message to Little America: "We have reached the vicinity of the South Pole. Flying high for a survey. Byrd."

Now that he had reached the South Pole, Byrd admitted that he felt little excitement. Later, while writing about his historic flight, he said: "One gets there and that is about all there is for the telling. It is the effort to get there that counts." After their little flag-dropping ceremony the aerial explorers turned the *Floyd Bennett* in the direction of Little America.

The first objective on their return flight was to locate the gasoline depot at the foot of the Axel Heiberg Glacier. When they landed, the temperature was an uncomfortable forty below zero. When the task of refueling was finally completed, the flyers resumed their homeward flight. To the cheers of their happy companions at the camp, they slid onto the runway at Little America, ten minutes after ten, on the morning of November 29, 1929. Byrd and his three fellow adventurers

had flown to the South Pole and back in fifteen hours and fifty-one minutes. Amundsen, using dogs and sleds, had made his round-trip journey to the Pole in three months.

Now that the many tasks of Byrd's expedition had been accomplished, the one thought of all the men was to break camp and head for home. The *City of New York* was due to arrive in a few weeks to pick them up. But they were doomed to disappointment. The pack ice turned out to be unusually thick that season and stretched for several hundred miles beyond the Ross Sea. The sturdy little *City* struggled through most of January and part of February to reach clear water and the Barrier landing. Just when it was on the verge of breaking free, a frightful gale struck.

Freezing rain and snow pelted the *City* until every portion of its upper works, rigging, mast and cabin tops, was coated with ice two and three inches thick. This added tons of weight to the ship which, along with the furious wind, very nearly swamped the vessel. Blown far off course, it wasn't until February 19, forty-four days after departing from New Zealand, that the *City* arrived at the Barrier landing.

There was no time to lose getting aboard ship. The Antarctic summer was fast slipping away, and there was danger of the pack freezing solid any day. Great quantities of supplies and equipment, along with the *Floyd Bennett*, were left at Little America as the expedition members scrambled aboard the *City*. In less than a day Admiral Byrd and his men got themselves and their belongings onto the relief ship. The mooring lines were released, and the sturdy little vessel hastened to force its way through the pack ice. Three weeks later Byrd and his men were at Dunedin, New Zealand, on the first leg of their return journey to the United States. Dunedin was the first sight of civilization for the happy explorers in almost a year and a half.

Admiral Byrd's first Antarctic expedition brought him much fame and many honors. He was the only man to have flown successfully over both the North and South Poles. More important, perhaps, the Antarctic had gotten into his blood. Long before the cheers over his aerial explorations had died down, Byrd was dreaming of another visit to the barren south-polar continent. Thus, in 1933, found himself deep in plans and preparations for a second expedition to Antarctica.

After his first exploration on Antarctica, Byrd was greatly impressed by the enormous size of that isolated land and the fact that man knew so little about it. The Antarctic Continent was truly a paradise for explorers and scientists. Admiral Byrd was eager to lead another group of specialists to Antarctica to help uncover a few more of its secrets. On his first expedition to the southern end of the world, a large new area of Antarctica had been found east of Little America. Byrd called this region Marie Byrd Land, after his wife. Now he wanted to explore it more thoroughly.

Collecting information on winds, temperatures, magnetic disturbances, marine life in the coastal waters and the nature of the polar continent's rocky surface, was one of the projects which Byrd planned to carry out on his second visit. Early in 1933, Byrd was giving all of his time to the job of getting his expedition organized and under way. One of his first tasks, and probably the most painful to explorers, was to collect funds to finance the expedition.

Thousands of letters were sent to every corner of the United States, to friends, strangers and industrial concerns appealing for help. The response was enthusiastic even though this nation was suffering badly at the time from an economic depression. Money and donations of equipment and supplies flowed in generously upon Admiral Byrd. Soon he had enough money on hand to begin buying the necessary ships, planes, dogs,

clothing, fuel and the thousand and one other items which a large expedition would need on a faraway, barren continent.

After much searching Byrd found two ships to carry his men and equipment to Antarctica. One of these was a wooden vessel that had made many voyages to the Arctic. Although fifty-nine years old, the ship had been stoutly built and was still in good condition. It was called the *Bear of Oakland*, after the city in California. The explorer's second ship was a World War I steel freighter which Byrd named the *Jacob Ruppert*, in honor of the man who had given large sums of money for the expedition.

Because he had achieved such good results with airplanes on his first visit to Antarctica, Byrd decided to use them extensively for his new explorations. He took along four planes, a large twin-motor transport type, two small single-engine planes, and a new kind of aircraft called an autogyro. This had large spinning blades mounted over its body which allowed the plane to take off and land in an almost straight up-and-down manner, much like present-day helicopters.

For traveling over the snow and ice, tractors were taken along as well as an improved type of snowmobile and, of course, the old standby, dog teams. Although Admiral Byrd was air-minded, he had great faith in dogs for polar work. More than 150 Huskies were carried to Antarctica. Byrd had no end of volunteers who wished to join his second Antarctic expedition. Seventy-two crew members, scientists and explorers were finally chosen. Of this number, fifty-five were destined to live and work with their leader on Antarctica.

Admiral Byrd got his second expedition under way on September 25, 1933, when he sailed out of Boston harbor aboard the *Bear of Oakland*. The *Jacob Ruppert* left Newport News, Virginia, three weeks later and both ships plowed their way slowly southward toward the Panama Canal. They were to



U.S. Navy

Evacuating supplies from Little America at end of Byrd's third Antarctic expedition. *Bear of Oakland* is anchored at barrier.

cut through the Canal to the Pacific Ocean and then continue south toward the Ross Sea and the Barrier Ice Shelf of Antarctica. Delayed by a violent gale and a brief stop at New Zealand, the two ships finally reached the pack ice after a journey of three months. Byrd pointed his vessel for the Bay of Whales, which the little steel freighter reached first on January 17, 1934, two weeks before the *Bear of Oakland* made her appearance.

When Byrd arrived at the Barrier, the weather was unusually warm. This made the anchoring of the ships more

hazardous than on the explorer's first visit. Massive chunks from the ice cliffs cracked free almost continuously and slid into the sea with a booming sound. As the ships approached the enormous wall of ice, Byrd spotted what he thought might be a good place to land his supplies and equipment. He turned to Bill Haines, his weather expert, for an opinion, when suddenly there was a loud explosion. A dark line crackled along the Barrier's face. In an instant, what before had seemed a sturdy rampart of steel-like ice was now transformed into a gigantic white waterfall of crumbling ice and snow. The two men stared in wonder at the mighty avalanche and thanked their lucky stars that the two ships had not been anchored there.

While Byrd looked for a good place to land the expedition's supplies and equipment, fifteen men were sent ashore with dog teams to investigate their old camp site at Little America. Byrd had counted on using the original buildings which would save a great deal of time and work erecting new ones. As the men approached the area, the black radio towers stood out vividly against the white snow. Supported by their steel wires, the masts had withstood the fierce Antarctic storms. But there was no sign of the buildings. They had all been buried under heavy drifts of snow. The explorers were prepared for just such a situation and soon were busy with their shovels tunneling down through the snow to the huts.

Admiral Byrd's men were amazed to find things just as they had been more than three and a half years before. The telephones which connected the various huts still rang. The electric lights worked, although they made only a dim glow. Food that had been left behind in 1930 was still preserved by the Antarctic cold. The men, hungry from their shoveling chores, lost little time eating it. The famous trimotor plane, the *Floyd Bennett*, and its smaller mate, the Fairchild, which had been

parked in their snow-block hangars, had not been harmed by the cold or storms. A quick check showed that, with a little work, both planes would be in excellent flying condition. Byrd was especially happy over this news because he now had a reserve fleet of airplanes with which to carry out his aerial explorations.

By the time the scouting party had returned to the Barrier's edge, a landing place had been found for the *Jacob Ruppert*. At the end of January they were joined by the *Bear of Oakland*. Day after day a long line of dog-drawn and tractor-drawn sleds paraded slowly over ice and snow to Little America and back to the ships. When the job of transporting supplies was completed, the *Ruppert* and the *Oakland* dropped their mooring lines and, by the end of February, 1934, were hurrying through the pack ice. Both ships were to spend the winter in New Zealand and return to pick up the explorers the following summer. Once more Little America became a thriving community, just as it had been during Byrd's first Antarctic visit.

The new planes were assembled and checked and housed in their snow-block shelters. The vitally important radio was put in operation and contact with the outside world was made. Something new was added to the radio activities this time. Admiral Byrd had arranged with one of the large broadcasting companies in the United States for a radio hook-up with his frozen outpost. On February 3, the explorer's voice flashed clearly and distinctly from the bottom of the world to his many friends and admirers in the United States. This was the first radio broadcast from Antarctica. Thereafter, the Admiral and members of his expedition went on the air regularly to keep their country informed of their activities.

Antarctic weather is always one of the main concerns of explorers on that ice-covered continent. Byrd planned to give

the subject a great deal of study during his second south-polar adventure. In addition to gathering information on winds, temperature and other weather features at Little America, the explorer and his scientific staff believed it would be most helpful if a weather station were set up on the Barrier far to the south. This station would not only help to provide more knowledge of weather conditions in the interior of Antarctica, but would also reveal how storms are formed in the regions surrounding the south-polar continent. Further, the Barrier station would be able to send valuable advance reports on the weather in its area for those planning overland air or sled journeys next spring.

The temperature was beginning to fall to 50 and 60 below zero when work on the Barrier weather station was begun. Because it would be unsafe to send men too far afield in such bitter cold, a point slightly beyond the 80th parallel, about 100 miles south of Little America, was selected. A train of four tractors pulling sleds loaded with food and equipment set out southward. The tractor party was guided by a plane flying overhead that picked out the easiest and safest-looking route to follow. Messages between the two units were exchanged by radio.

Arriving at their destination without adventure, the explorers quickly began to set up living quarters. A deep foundation was dug and the hut was sunk into it. This would provide protection against the wintry gales. Two giant storage tunnels leading from the entrance of the building were dug beneath the snow. These were big enough for a man to walk through upright. Food and fuel supplies and a generator for operating the radio system were placed in the tunnels. Thus it was possible for the man tending the station to take care of all his needs without going outdoors.

Admiral Byrd's original plans called for three men to occupy

the weather station. But due to delays in unloading the ships and with the long winter night fast approaching, there was no longer time to transport the necessary supplies and equipment to serve three explorers. Sending two men was also decided against. Cooped up in a single, small room for almost six months, they would probably end up quarreling. Tending the weather station was a one-man job, Byrd decided. But whom to select for the lonely and dangerous task? Admiral Byrd did not take long to come to a decision. He would do it. It would be unfair to ask anyone else to go through the lonely vigil. On March 22, after bidding good-bye to his friends at Little America, Byrd climbed into a plane and flew out to his isolated outpost. Six days later he said farewell again, this time to the construction crew who, after completing the weather station, hopped aboard their tractors and sleds and headed north for the main camp.

The explorer was alone now, miles from the companionship of his friends at Little America. He was surrounded by a desert of snow and ice. Byrd wondered about the days that lay ahead as he began the long, lonely, silent vigil. Was he equal to the ordeal? Cooped up in his shelter, Byrd had many things to keep him occupied. His main job, of course, was to check the weather instruments at regular intervals. This had to be done without fail and the results recorded. Meals had to be cooked and his tiny room kept in order. Three times a week Byrd had to operate his radio set to communicate with Little America. It was very important that this schedule be kept up. If the explorer failed to make contact with his friends, they would become uneasy and fearful that some misfortune had overtaken him. For relaxation, Byrd had lots of books to read and his diary to keep up to date. When the weather was fair, he sometimes crawled out onto the surface for short walks in the snow to catch a breath of fresh air and a little exercise.

April passed comfortably. The Admiral's life had settled down to a steady routine. It was the first part of May when the difficulties began. The Admiral's loneliness brought on a feeling of gloom. More serious was the breakdown of his stove. This was an oil-fired unit that served to heat Byrd's quarters and cook his meals. A long stovepipe carried the smoke and fumes up through the snow to the outside. When his men were installing the pipe, they discovered that not all the sections had been brought from Little America. The men had done the best they could by substituting a makeshift section which they had made from several tin biscuit boxes. For awhile the pipe seemed to work all right. But after little more than a month it suddenly failed. It no longer drew a proper draft and smoke and oil fumes backed up into Byrd's room. In addition, the gasoline motor which ran the generator became faulty and gave off poisonous carbon monoxide. Byrd did everything he could to fix the stove and motor but could not stop them from producing their deadly gases. Several times he tried clearing the air from his hut by opening the door. The frigid Antarctic winter air—50 and 60 below zero—quickly ended that.

One day, while making his regular radio contact with Little America, Byrd fell to the floor unconscious. When he awoke he was deathly sick and he knew that he had inhaled more monoxide gas than his body could safely take. Almost every day thereafter he had horrible spells of nausea and headaches. He was no longer able to eat properly and became terribly weak. He also suffered a great loss in weight. It was only through superhuman effort that Byrd managed to keep at his chores of checking the weather instruments and sending his regular messages to the base camp. By the time June came, however, he realized that he was badly in need of medical attention. Byrd said nothing of this to his friends at Little America. He had made up his mind that he would see this thing

through until he was unable to carry on any longer. He knew that his friends would have dashed immediately to his rescue if they had been aware of his condition. But the Antarctic winter was no time for a man to be roaming about and Byrd did not wish to endanger any lives.

The men at Little America could tell from the tone of Byrd's messages that all was not well, much as he tried to hide the truth. Dr. Thomas Poulter, whom Byrd had left in charge at the base, decided to send out a scientific party even though the numbing cold continued. He wanted to study meteor displays at Byrd's weather station and to take readings simultaneously with those at Little America. It would also be an opportunity to see if anything was wrong with Admiral Byrd. A cabin of canvas and wood was built on one of the tractors for protection against the cutting wind. Dr. Poulter and several companions climbed aboard the vehicle on July 20 and set out for Admiral Byrd. Sixty below zero temperatures and a blizzard put an end to their attempt as the men were forced back to Little America.

It wasn't until August 4 that weather conditions improved enough for Dr. Poulter to make another attempt. But once more the rescuers had to turn back, this time because their tractor broke down. Four days later they made a third attempt to get to Byrd, and this time the men succeeded. They reached their leader on August 10th. Byrd had been kept informed by radio of the rescue party's progress. When he thought they ought to be nearing his station, he climbed out of the snow-bound hut to await their coming. The first sign of the approach of the rescuers was the flashing beam of the tractor's searchlight as it stabbed through the gloomy Antarctic night.

Byrd was a relieved and happy man as he greeted his friends. They, in turn, were shocked at the sight of their leader—thin and weak looking, with a gray complexion. Byrd was too weak

to be taken back immediately to Little America. The party stayed at the weather station for two months before the explorer was strong enough to be flown to the base. Temporary but effective repairs were made on the stove and gasoline-powered generator so that living in the weather station once again became safe.

Although Admiral Byrd had been ill for more than half of the 130 days he spent on his solitary watch, he had succeeded in gathering a mass of weather information. Temperature readings at the outpost provided some of the more interesting data. The coldest point which Byrd's thermometer recorded was minus 83 degrees Fahrenheit.

Byrd's second Antarctic expedition accomplished almost all the things planned for it. Much of the coastline of Edward VII Peninsula, which lay east of Little America, was surveyed and mapped. Many exploration journeys were made deep into Marie Byrd Land. Geological studies were carried out at different points of the Antarctic Continent's surface. Finally, a large amount of Antarctic weather information was collected. All in all, Admiral Richard Byrd was greatly pleased with the achievements of his second visit to the south-polar continent.

In January, the *Bear of Oakland* and the *Jacob Ruppert* returned to the Bay of Whales to take the explorers home. The airplanes and other heavy equipment were put aboard the ships. On February 6, 1935, to the great delight of all, the two ships set sail for home.

During the course of his second expedition to Antarctica, Byrd's path was very nearly crossed by another American adventurer who had come to the south-polar continent. This was Lincoln Ellsworth, who had many Arctic adventures to his credit. When Ellsworth became interested in Antarctica, he planned an ambitious aerial exploration trip across that continent. He wanted to fly from a point on the Ross Sea coast

to the Weddell Sea region and return. He hoped to find out if the mountains in the Ross Sea region extended straight across the ice-bound continent to the Weddell Sea side. Ellsworth believed that the flight might also tell whether Antarctica was divided by a water passage between the Ross and Weddell Seas or whether it was a solid land mass.

Lincoln Ellsworth tried three times to carry out his trans-Antarctic flight. In January of 1934, he had his monoplane, the *Polar Star*, parked on the ice preparing it for take-off when the ice broke and twisted his aircraft out of shape. The plane had to be brought back to America for repairs. A year later Ellsworth again sailed to Antarctica aboard his little ship, the *Wyatt Earp*, for a second try at his air mission. This time the American explorer had changed his plans. He intended now to fly only one way—from the northern end of Palmer Peninsula on the Weddell Sea side of Antarctica to the Bay of Whales in the Ross Sea area, a distance of 2,300 miles. The *Wyatt Earp*, meanwhile, was to sail for the Bay of Whales and there pick up the flyers.

For two months Ellsworth and his pilot, Hollick Kenyon, waited for good weather. At last their patience was rewarded with clear skies and sunshine on January 3, 1935. The explorer's low-wing, all-metal monoplane, the *Polar Star*, which was specially fitted with skis for take-offs and landings on snow, had been held in instant readiness for the first good sign of a break in the weather. When the moment came, Ellsworth and his pilot quickly warmed the plane's motor and were in the sky headed for the Ross Sea.

But the flyers were not in the air long before the unpredictable Antarctic weather again decided to interfere with Ellsworth's plans. Gale winds and a sudden blizzard forced the men to turn around and fly back to their base. The bad weather continued for several weeks longer, and by the time

it cleared the Antarctic summer was almost over. Ellsworth, disappointed, now had to postpone his exploration until the next spring.

In November of 1935 Lincoln Ellsworth and Kenyon were back on the south-polar continent for their third attempt to fly from the Weddell Sea to the Ross Sea. This time they were not forced to wait weeks for good weather. On the twenty-second of November, favored by clear skies and little wind, they took off smoothly from the snow runway on Dundee Island and zoomed the heavily laden *Polar Star* into the Antarctic sky.

After flying fourteen hours over immense stretches of frozen wasteland and rugged mountain ranges, Ellsworth and his pilot decided to make a landing in order to check their position more accurately. They were lucky to find a patch of snow, level and large enough to accommodate the *Polar Star*. Stiff-legged and weary, they climbed out of the plane to survey their surroundings. They stood in the midst of a vast snow plain; the glaring white surface stretched endlessly in all directions. Like all Antarctic explorers since the days of Scott, the flyers wore dark glasses to protect their eyes from snow blindness. The explorers had landed on a portion of the great Polar Plateau that had never been seen before. Ellsworth unfurled an American flag and took possession of the region for the United States. He named the newly found area after his father, James W. Ellsworth Land.

A small tent was put up, and the men decided to rest a while before continuing. They took a good shot of the sun with the sextant and were able to fix their exact position. Meanwhile, their friends aboard the *Wyatt Earp* feared that Ellsworth and Kenyon had met with an accident. Ever since the take-off the two had been in constant contact by radio. This suddenly stopped when the radio equipment aboard the *Polar*

Star broke down. After several days of anxious waiting, hoping desperately that the flyers might somehow get word through of their safety, the crew aboard the *Wyatt Earp* sent out an SOS. Their radio message told the world that the explorers were lost and help—especially airplanes—was needed to search for them.

Refreshed after a stay of nineteen hours, the two explorers took to the air again on November 24th. But they were airborne only thirty minutes before the weather turned bad and forced them to land. Out came the tent once more, and the men camped near the *Polar Star* until the weather cleared. It was three days before they had a chance to get into the air again. An hour later gale winds and blinding snow forced them to land a second time.

The explorers were blizzard-bound for more than a week, suffering painfully from the cold. Their food supply was running low and Ellsworth and Kenyon agreed that regardless of the weather they had better get the *Polar Star* into the air and try to reach the Ross Sea as quickly as possible. But after a week of blizzard weather, the *Polar Star* was buried deep beneath snowdrifts. The explorers had to shovel many weary hours before they had their plane clear. The bitter cold had frozen the plane's engine and, in order to start it, a canvas shelter had to be put around its nose and a fire built inside. The heat thawed out the metal and oil so that the propeller could be spun. Finally the explorers got the *Polar Star* off the snow and were winging along the last lap of the trip. Before long, the plane ran out of gasoline and the men had to make another forced landing about sixteen miles from the Bay of Whales. According to their charts, they knew that Little America was somewhere in the region, and they decided to look for Admiral Byrd's camp, hoping that they would find shelter and perhaps some food. They tied down the *Polar Star*

as best they could so that gale winds would not blow it away. Equipped with snowshoes and pulling a sled with their camping equipment and the remaining food, the flyers set off for Little America.

It took them a week to find the camp which Byrd and his men had left almost a year before. The only signs of the site were the poles and towers of the radio antennae sticking up through the snow. All the buildings were completely covered. After jabbing their shovels into several different spots they chose one that looked promising and started to dig. They had made a good guess because before long they were inside a hut which turned out to be Admiral Byrd's radio shack. Now they not only had a good shelter fifteen feet under the snow but they had also found enough precious food to last many weeks.

Ellsworth and Kenyon lived comfortably at Little America for a month before they were rescued. The call for help sent out by the *Wyatt Earp* was heard in Australia and the government there immediately ordered the *Discovery II*, a whaling research vessel, to Antarctica. Two airplanes were put aboard the craft before it left for the Bay of Whales, which the Australians knew had been Ellsworth's goal.

As the rescue ship entered the Bay, it spotted a tent and an orange-colored pennant put up as a signal at the shoreline by the Americans. A note left inside the tent said that the two men were at Little America. After the Australians found the message and got their planes in flying condition, they headed for Admiral Byrd's camp. Kenyon was the first to hear the airplane motors. He rushed out of the radio shack to the surface and waved a happy greeting to the Australian pilots. Soon thereafter a sledge party from the *Discovery* arrived and the rescued flyers were on their way to the more civilized comforts of the ship.

Three days after the Australian rescue ship sailed into the Bay of Whales, the *Wyatt Earp* made its appearance. Ellsworth and Kenyon joined their companions who, having feared the flyers lost, gave them a warm and noisy welcome.

The *Polar Star* was salvaged and stowed aboard the *Wyatt Earp* for the long trip home. The historic little airplane was eventually turned over to the United States National Museum, Washington, D.C., where it may still be seen.

Lincoln Ellsworth and Hollick Kenyon had been gone for twenty-two days. During this period of their aerial exploration they had discovered a vast new region of the Polar Plateau as well as several new mountain ranges. The flight had also convinced Ellsworth that there was no water route linking the Weddell and Ross Seas, as some Antarctic explorers believed.

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EXPLORERS' PARADISE

FOUR YEARS after his second south-polar expedition Admiral Richard Byrd had regained his health and was deep in plans for a third visit to Antarctica. That silent, ice-bound continent, shrouded in its snowy mantle of secrecy, exercised a strange hold on him. He was restless and eager to go back to discover further secrets locked in the ice and snow. He gathered together a new group of scientists and explorers, and with supplies and equipment safely stowed aboard the expedition's two ships, left the United States for Little America in the summer of 1939.

Unlike his first two visits to Antarctica, Byrd's third expedition was partly supported by the American government. Not since 1840, when Lieutenant Charles Wilkes was sent down to explore the coast of Antarctica, had the American government shown any interest in this remote land. Byrd's discoveries during his two earlier explorations on the south-polar continent had awakened a new curiosity, and this time the government supplied much in the way of food supplies, fuel, clothing and equipment.

Admiral Byrd organized his third Antarctic expedition with

his usual care and thoroughness. Two ships, the sturdy veteran, *Bear of Oakland*, and the *North Star* carried the explorers to the south-polar continent. Byrd had decided that exploration would be the main task of his polar party on this trip. He wished to investigate many areas in Marie Byrd Land that had been overlooked during his second visit. He was also curious about other sections of Antarctica farther east which he planned to survey.

When Byrd and his men reached the Ross Sea, he divided the expedition into two sections. One group went on to Little America to open that base for exploration work for a third time. The second group, aboard the *Bear of Oakland*, established a camp far to the east at Marguerite Bay near the Palmer Peninsula. Both east and west parties, with the help of their planes and dog sleds, mapped thousands of square miles of Antarctica.

The explorers at Marguerite Bay flew up and down the length of mountainous Palmer Peninsula, mapping accurately for the first time much of the south-polar continent's rugged northern arm. Alexander I Island, discovered more than 100 years before by Bellingshausen, and lying a short distance off the southwest coast of the peninsula, was thoroughly explored from the air. In addition, Byrd's men surveyed a number of the bays and inlets that fringe the ragged coast of Palmer Peninsula.

At Little America, Admiral Byrd and his men were no less active with exploration work. Airplanes and dog teams were used as they ranged far to the east of their camp to search out and map new features of Marie Byrd Land. The mountainous ramparts leading up to the region of the Polar Plateau also occupied many days of investigation for the expedition.

Admiral Byrd's third visit on Antarctica was brief. By the spring of 1941, he and his men were back home. Even though



U.S. Navy

Curtiss Condor used by Admiral Byrd for making aerial surveys on third Antarctic expedition.

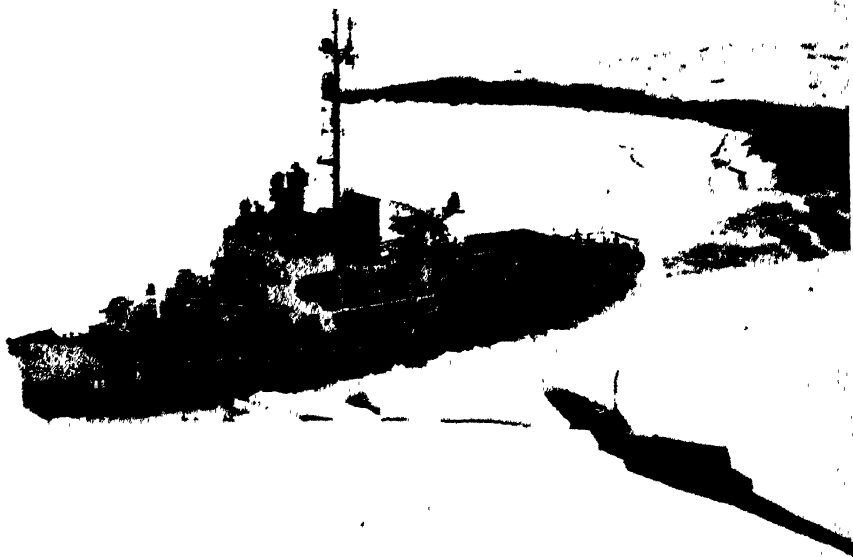
his stay was short, Byrd was able to return with much new information about the geography of Antarctica. He discovered that mountains, glaciers, bays and other landmarks found by earlier explorers had frequently been wrongly placed on charts. Many of these were now located more correctly. Accurately mapping Antarctica, Byrd felt, was as important as discovering new regions of that huge continent.

After Admiral Richard Byrd's third visit to the land of the

South Pole, Antarctica was forgotten by the world for almost six years. World War II was raging full blast during most of this period, and countries had little interest or time for exploration activities. Although Byrd himself was busily engaged in wartime duties, Antarctica and the endless work that remained to be done there never left his mind. When the world conflict came to an end in 1945, the explorer was ready with the most ambitious program that had ever been conceived for exploring Antarctica. He proposed taking an entire fleet of warships to the southern end of the world for a massive invasion of the south-polar continent.

In order to carry out his scheme, Byrd had first to convince the United States Navy Department that the idea was both practical and worth while. He argued that the journey would be an excellent way to train men in handling warships in polar climates. Byrd also impressed on his superiors that a large-scale expedition to the Antarctic Continent would save years of laborious exploration by small groups of individuals. Admiral Byrd described his plan in such a convincing manner that not long afterward the Navy and other government bureaus gave him the go-ahead signal.

Admiral Byrd's fourth visit to Antarctica was wholly a United States naval affair. The expedition was prepared on a giant scale and given the code name "Operation Highjump." It was made up of thirteen navy ships, 4,000 men and a large fleet of airplanes. The most important of the naval vessels were the giant aircraft carrier, *Philippine Sea*, and two icebreakers, the *Northwind*, a Coast Guard vessel, and the *Burton Island*. The remainder of the fleet was made up of seaplane tenders, tankers and destroyers. There was one submarine, the *Sennet*, in the fleet. It had been included mainly to find out how well submarines can operate in ice-filled seas. The *Mount Olympus* served as the expedition's command ship.



U.S. Navy

U.S.S. *Northwind* breaking ice in Bay of Whales.

The most impressive of the different kinds of airplanes that went along with the Antarctic fleet were giant twin-engine seaplanes called Martin Mariners. These gull-winged aircraft weighed thirty tons when loaded to capacity with gasoline and cargo. They could fly more than 1,500 miles—about the distance from New York to Miami, Florida—before returning to their base. The Mariners proved to be wonderful work horses when the time came for mapping and survey work. Six of these massive Mariners were carted to the Antarctic region aboard the seaplane tenders.

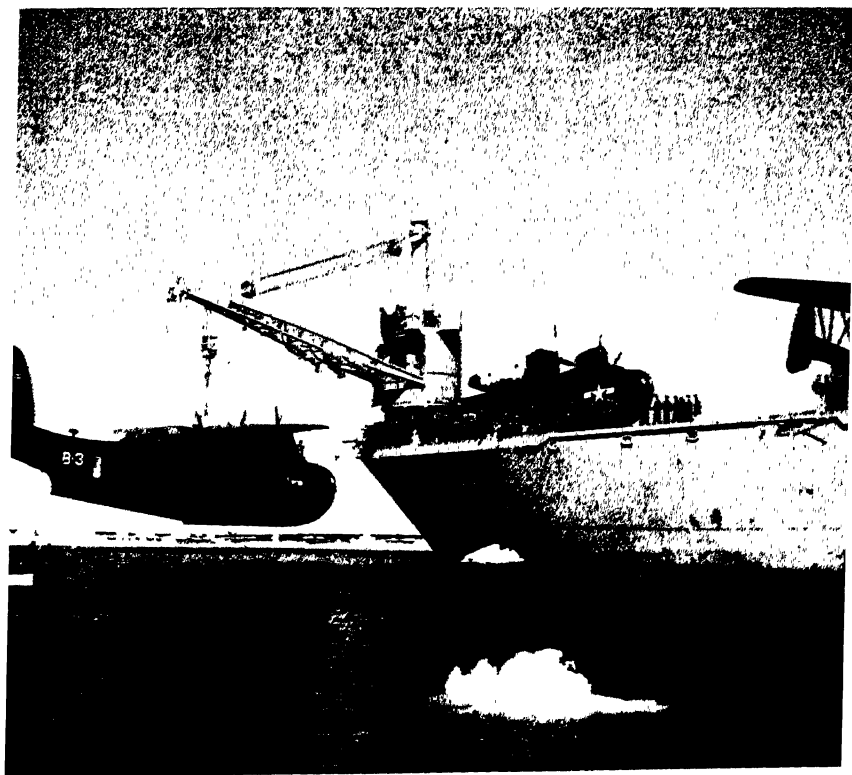
In addition to the Mariners, the expedition also had a fleet

of six land-type air transports, known as Douglas DC-3's. These two-motored transports, until World War II, were famous as commercial airliners throughout the world. Byrd planned to use them for transport and long-range aerial exploration. They were stored on the deck of the aircraft carrier en route southward.

During late November of 1946 the armada of Operation Highjump pulled up anchor in the United States and headed for the Antarctic Continent. The entire fleet was under the command of Rear Admiral Richard H. Cruzen who had been with Byrd on his visit to Antarctica in 1939. Admiral Byrd was

PBM-5 being readied for survey flight during Operation Highjump.

U.S. Navy



in overall charge of the scientific and exploration activities which were to cover an entire continent.

As the fleet neared its goal, the expedition was split into three groups. The main or central group, which Byrd was to accompany, was to head for the Bay of Whales and Little America. Other ships were separated into an eastern group, which was to explore the Antarctic coast of Marie Byrd Land, the Palmer Peninsula and the region of the Weddell Sea. The remaining ships were organized into a western task group whose job it was to explore along the coast of Wilkes Land. They were to continue moving westward until they met the eastern group. In this way the expedition planned to circle Antarctica completely and to explore as much as possible of its coastline. The east and west task forces of Operation High-jump traveled a distance of more than 16,000 miles, greater than five times the width of the United States.

Not all the ships of the central group were to be taken into the Bay of Whales. It was impossible for the massive aircraft carrier, *Philippine Sea*, to enter. The vessel's huge size would not permit maneuvering in ice-filled waters. Neither were the carrier's thin steel sides good protection against the blows of granite-hard ice floes. Because the carrier would have to stay outside the pack ice, it was planned to fly the big DC-3's from the ship's flight deck to Little America. This was a risky job since planes that size had never before been flown from a carrier deck. Runways about 2,000 feet long were the usual distance needed for these twin-engine transports to climb into the air. The *Philippine Sea* was only a little more than 800 feet from bow to stern.

During World War II aviation engineers had made many exciting advances. One of the most interesting was a method for getting heavily loaded airplanes into the air after a run of only several hundred feet. Small rocket motors fastened to

the outside of a plane's body gave the extra lifting power. The added power of the rockets along with the plane's regular engines would actually shoot the aircraft into the air at a very sharp climbing angle. Once the plane was in the air, the rocket units were automatically dropped. This method of helping planes take off was called "jet-assisted take-off" or JATO for short. Byrd planned to use these rocket or JATO units for getting his large transports off the carrier's deck.

The wings of the DC-3's, stretching more than 110 feet from tip to tip, were another hindrance. They could not get by the superstructure of the carrier so that only half the flight deck could be used. To make the take-off more difficult, each of the planes had to carry an extra ton of supplies above the weight they normally were able to lift. Another hazard that had to be considered was the landing gear. Engineers had to make a combination wheel-and-ski arrangement for the transports so that they could not only roll across the flight deck of the carrier but also make a ski landing on the snow runway at Little America. Despite all the risks, Admiral Byrd went calmly along with the preparations for the attempted take-off. He was optimistic about the whole affair.

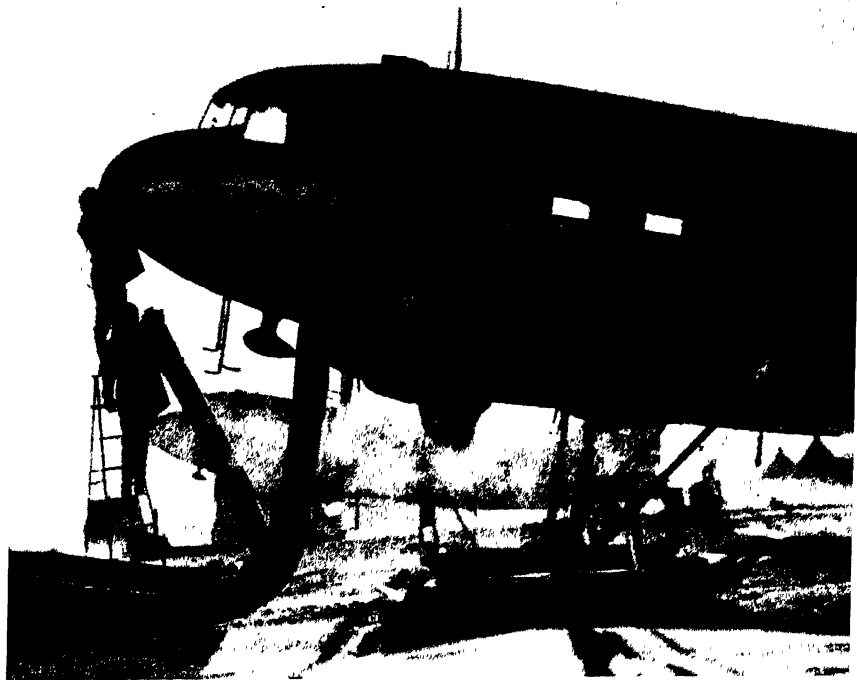
As the *Philippine Sea* approached the edge of the pack ice, it was turned into the wind and the DC-3's were made ready for their flight to the Antarctic continent. Byrd shook hands with the skipper of the carrier and climbed into the first transport. At a signal, the blocks beneath the wheels were pulled free, the twin engines were gunned to full power and the plane began to roll. Suddenly a great billow of smoke and flashing flame shot out from beneath the DC-3 as the rockets were fired. With a thunderous roar the heavily loaded transport zoomed upward at a sharp angle into the air and, climbing steadily, headed out over the pack ice for the Ross Barrier and Little America.

The first successful, fiery take-off was repeated five times as the other planes followed one by one. The maneuver proved easier than anyone had dared to hope. Several hours later Admiral Byrd and his fleet of twin-engine giants came down smoothly and safely at Little America's snow-bound airport. The wheel-ski landing gear worked beautifully. Later the plane's wheels were removed and only the skis used in order to cut weight. The aircraft were to take off and land only on snow now that they were based on the Antarctic continent.

Long before Admiral Byrd and his companions had left the *Philippine Sea*, several of the smaller ships of the central task group had nosed their way into the Bay of Whales. A water path through the heavy ice had been cleared for them by the icebreaker *Northwind*. This powerful ship had even carved out a small harbor in the ice-choked bay which, in 1946, was almost completely frozen over. On Byrd's previous visit there had been great stretches of open water.

The *Northwind* was a most unusual ship and proved tremendously helpful to Operation Highjump. The vessel was designed and built for just one job—to cut a path through thick ice fields. A heavy steel bow, strongly reinforced, plus engines of 10,000 horsepower, were the icebreaker's powerful muscles. With its great strength and weight of 6,600 tons, the *Northwind* could plow its way through a three-foot-thick field of ice at a speed of ten knots. It could also batter down an ice wall thirty feet in thickness. During the three days the *Northwind* crunched out an anchorage in the Bay of Whales for the supply ships, it smashed more than fifteen million tons of ice into small chunks.

An advance guard from the central task group went ashore to prepare Little America for Admiral Byrd's arrival. They found that more than six years of Antarctic blizzards had largely covered the radio masts. Only eighteen feet of their



U.S. Navy

Preheating aircraft engines is a "must" on Antarctica.

original sixty-foot height remained above the snow. When the men dug their way into the huts they saw giant icicles hanging from the ceilings and walls. Moisture had seeped into the shelters and had frozen. The men also discovered food left from Byrd's visit in 1939-40 (as well as 1928-30) and to their surprise found it still edible. One delightful find was a steak which the explorers ate in quick time. The Antarctic cold had proved to be an excellent refrigerator.

Shortly after Admiral Byrd and his fleet of six transports arrived at Little America he got down to the business of exploring and mapping from the air. Almost every day, weather permitting, one or more of the big DC-3's was in the air with a camera crew mapping and surveying. These were no ordinary cameras which Byrd's men used. They were called

trimetrogon cameras and could take three-dimensional views of the area photographed. They were developed during World War II for spying upon enemy territory from the air. The cameras produced very accurate mapping pictures. The planes based at Little America flew for the most part in a southerly and westerly direction. They were able to survey and study in great detail the towering peaks, deep valleys and giant glacier rivers of the Queen Maud Range and the mountains on the western rim of the Ross Ice Barrier.

The most outstanding job of the central task group was Admiral Byrd's second flight over the South Pole. He did not make this journey just for the honor of being the only one to have reached the Pole twice. He was deeply curious to know what lay in the region far beyond the South Pole. No one had yet been able to explore that part of the polar continent. The long flying range of the DC-3 gave Byrd the opportunity to carry out his plan. Two planes were to make the trip, and both were loaded with as much gasoline as it was possible to put aboard. The journey was going to be a long one, non-stop round trip, and Byrd wanted to make sure they would have enough fuel for getting back to Little America.

On February 15, 1947, his weather experts reported excellent flight conditions. At 11 o'clock that evening the planes were poised on the runway and ready to take off. Because of the extra load the planes were carrying, Byrd had the JATO units installed to help with the take-off. The plan worked and both planes rose safely into the air and were soon winging their way toward the South Pole.

Admiral Byrd's second journey to the South Pole was no pleasure trip even though the DC-3's were faster and more efficient than the plane he used on his flight in 1927. The intense cold—it was minus 40 degrees outside the planes—caused some of the equipment to break down. Aboard Byrd's

plane, failure of the heating system was the most serious trouble. He and his companions suffered badly from the cold, their hands especially, because they had to be left uncovered. The cameras and navigational instruments could not be handled properly with gloves on.

At one time, while operating the sun compass, Admiral Byrd could not free his bare hand from the instrument. The cold had cemented his skin to the metal. On the windshield, ice formed constantly, and the flyers scraped it off with knives or dissolved it with alcohol. Despite their great discomfort they droned onward through the crackling, clear air, hour after hour. Finally, at five in the morning of February 16, the navigator's figures showed that they had arrived at the South Pole. The two planes circled around the southernmost point of the world and then Admiral Byrd threw overboard a small container holding the flags of the United Nations.

After circling the Pole briefly, they flew on toward the great unknown land beyond. For a hundred miles they continued their aerial journey. They could see nothing but the flat white stretches of the Polar Plateau, ranging for hundreds of square miles in all directions. Good weather made visibility just about perfect. But their dwindling gasoline supply made them turn the planes around and head for home.

The return route took them over the Beardmore Glacier and past the towering peaks surrounding that giant river of ice. Although Byrd reported that they were flying at an altitude of 12,000 feet, many of the mountain peaks soared above the planes. The mapping cameras were kept busy making a record of the rugged, magnificent scenery below.

They were interrupted in their surveying work by a radio message from Little America saying that the weather at the base was turning bad. The warning was heeded and the pilots of the two planes quickly turned and headed for home along



Byrd Antarctic Expedition II

Admiral Byrd taps out Morse code at Bolling Advance Weather Outpost while cranking hand generator.

the shortest route. They landed safely just before the storm broke. Byrd and his men had flown steadily for twelve hours for a non-stop distance of almost 1,800 miles. They had seen and mapped vast areas of Antarctica never beheld by human beings before.

Probably the most interesting of the many discoveries made

by Operation Highjump was the one made by a team of explorers attached to the western task group. Flying inland in the region of Wilkes Land aboard their giant Martin Mariner, they suddenly came upon a huge patch of Antarctica that was completely free of snow or ice. Bare rock extended for more than 200 square miles throughout the area. Many open-water lakes, large and small, were scattered about the region. Vivid reds, blues and greens tinted the surface of the lakes. Choosing one of the largest of these unfrozen lakes, the pilot of the Mariner brought his big seaplane down for a landing. Slowly taxiing along, the crew dipped up samples of the water and reported that it was warm to the touch.

This warm, isolated spot in the midst of the frozen Antarctic Continent was a puzzle to the scientists. Much further study of the area will have to be made before an answer is found.

Operation Highjump completed its work in March of 1947. The expedition left the Antarctic Continent before the winter freeze set in. This great army of explorers had done their work well. More than 900,000 square miles of Antarctica were explored for the first time. Hundreds of new mountains were discovered as well as many bays, islands, glaciers and peninsulas. More than 4,500 miles of Antarctic coastline were mapped with greater accuracy than ever before. And yet, even though Operation Highjump invaded Antarctica with an armada of ships and an army of men and equipment, the expedition's achievements only dented the surface of the south-polar continent. Vast regions of Antarctica still lay hidden under an enormous blanket of snow and ice.

Not long after Operation Highjump returned to the United States, another American expedition was on its way to Antarctica. This was a small, private group led by Commander Finn Ronne. Like the famous Admiral Byrd, Ronne was an

officer in the United States Navy. Indeed, he had made his first visit to Antarctica as a member of Byrd's 1933-35 expedition. Ronne's love for exploration was probably inherited from his father who had been with Amundsen when the Norwegian reached the South Pole. The elder Ronne had also been a member of Byrd's first Antarctic expeditions. He was an expert at making and repairing polar clothing, and his skill was eagerly sought by explorers.

Ever since his first Antarctic adventure with Byrd, Commander Ronne had dreamed of leading his own party someday to that remote part of the world. His opportunity came in 1947. He left the United States on January 26 of that year with twenty-three young men, some of whom were weather experts, others were geologists and physicists. The rest were going to the land of the South Pole mainly for the love of adventure. Commander Ronne's wife and the wife of one of the aviators were also included in the party. They were the first women ever to visit Antarctica. Expedition members, dogs, sleds, airplanes, mountains of food and equipment were all crammed aboard the *Port of Beaumont*. This was a wartime ocean-going navy tug, a sturdy ship with a stout wooden hull. The vessel was 183 feet long and driven by powerful Diesel engines. As matters turned out, Commander Ronne could not have had a better ship for carrying his expedition to Antarctica.

Ronne's goal was Marguerite Bay near the bottom of the Palmer Peninsula, where he intended to set up his living quarters. Admiral Byrd had left several huts here during his 1940 expedition which Ronne also expected to use. He had prepared a large program of work for his expedition, which included both scientific activities and exploration. Weather studies were to be made, rocks were to be analyzed to find out the past history of the continent, marine life in the coastal waters was to be observed and delicate instruments were

to be set up to record any earthquake shocks in the region.

The exploration work was to cover a detailed study of Palmer Peninsula to find out its exact northward direction and length. The explorers were also to map as much of the Antarctic coast that bordered the western edge of the Weddell Sea as they could.

Almost all the members of Ronne's expedition were visiting this region for the first time. But what they lacked in experience, they certainly made up for in energy and willingness. By dog sled, airplane and patient use of the many scientific instruments which had been set up throughout the camp area, most of the goals of the expedition were achieved. Many hundreds of square miles of Weddell Sea coastal areas were mapped, while dozens of notebooks were filled with scientific information which had been slowly gathered over the course of many weeks of study and observation.

The United States was not the only country to send an expedition to Antarctica during the postwar years. Norway, Britain and Sweden sent a combined group of scientists and explorers to the land of the South Pole in 1949. The expedition made a close study of Antarctic weather, glaciers and the rocky undersurface of that continent. More than 100,000 square miles of Antarctica facing on the Weddell Sea were also surveyed with aerial cameras. The expedition of the three countries, which was made up of fifteen men, spent two years on Antarctica. They left for home aboard their ship, the *Norsel*, on January 15, 1952.

9

THIS IS ANTARCTICA

ANTARCTICA, the seventh continent on this planet, is almost like a circle in shape. Two gigantic dents in this circular form, one made by the Weddell Sea and the other by the Ross Sea and Ross Shelf Ice, almost cut the south-polar continent in half. Geographers believe the world's southernmost land mass is about six million square miles in size, almost equal to Australia and Europe put together. Antarctica is made up of an immense inland frozen plain two miles above sea level and endless mountain ranges that surround its outer edges almost completely. Beneath the snow and ice which cover almost every square mile of this desolate continent is a rocky sub-surface. This makes the home of the South Pole far different from that of its twin, the North Pole. The northernmost tip of the world is located on an ice field that floats on water nearly two miles deep.

Wildly jumbled mountain ranges block the way to the Antarctic plateau region and the South Pole. There are peaks among these mountains that soar into the frigid air more than 12,000 feet. Some explorers believe there may be mountains,

not yet discovered, that may outreach the 29,002 feet of the world's highest known peak, Mt. Everest. The Polar Plateau that lies beyond these rugged mountains forms more than three-quarters of the area of Antarctica. Explorers who have traveled over its white, monotonous stretches, have recorded the Plateau's height from 9,000 feet to a little more than 11,000 feet near the South Pole.

The Polar Plateau is one of the most interesting features of Antarctica. It is actually an enormous layer of snow and ice, like a thick coating of icing on a cake. In some places the snow and ice were found to be more than 5,000 feet thick. It would take four Empire State Buildings placed one on top of the other to equal this thickness. Beneath the ice layer lies rock. The Plateau is the breeding ground for many of the giant glaciers that twist their way down to the sea between sky-scraping mountain peaks. Some of the world's longest and widest glaciers are to be found in the land of the South Pole.

Antarctic glaciers flow to the sea along gentle slopes or drop straight down like frozen waterfalls. These rivers of ice provide the only avenue for getting up to the Polar Plateau on foot. Shackleton's discovery of the Beardmore Glacier was the first of the practical routes by which explorers could crawl to the top of the Plateau. More than fourteen miles wide in places and winding its crooked path down through the mountains for 100 miles, the Beardmore is one of the largest of Antarctica's rivers of ice. Although glaciers may be the only way of getting onto the Polar Plateau on foot, they are hazardous to travel over because of crevasses.

Glaciers help to form another of Antarctica's interesting geographical features, shelf ice. This is formed when the rivers of ice move off the continent and on out to sea. The seagoing glaciers float on the water while still remaining attached to the land. When several such glaciers meet out in the sea they

usually form an immense ice field that may extend several hundred miles from the shore of the continent. From water level, the edge of these ice shelves, also known as barriers, may rise to a height of 100 feet. Antarctica has a number of these floating glaciers, among others the Shackleton Shelf Ice of Wilkes Land, and the Filchner Shelf Ice reaching into the Weddell Sea. But the largest and by far the most famous is the Ross Shelf Ice discovered by and named for the British explorer, Admiral Sir James Clark Ross.

The Ross Shelf Ice or Barrier, as it is more often called, ranges out to sea for about 400 miles. From its eastern to western edges it stretches more than 600 miles. It is about as big as France in size. Much of the Barrier reaches above the water to a height of 100 feet, while more than five times that depth is submerged beneath the water. The Ross Barrier stabs deep into the interior of Antarctica, to within 300 miles of the South Pole. Because of this, the enormous and rather level Barrier has been the favorite gateway of explorers heading for the Pole. Amundsen, Scott and Byrd, among others, all had bases on or near the Barrier.

The edge of the Ross Shelf Ice facing the sea is often battered by storm-whipped waters. This, together with the warmer temperatures of Antarctic summers, causes massive pieces of the Barrier to break loose and float northward. This iceberg-forming action is called "calving." Unlike the pointed or mountain-like bergs that float down from the arctic waters, those that break off the Barrier have an odd, flat-top shape. Antarctic icebergs are the largest in the world. Explorers have seen some that were equal in size to Manhattan Island and even Long Island, which is more than 120 miles in length and twenty-five miles in width.

Before explorers ever reach shelf ice, or the continent itself for that matter, they must make their way through the pack ice.

Pack ice is usually about three feet in thickness. It has been known, however, to get as much as seven feet thick. The size and thickness of a field of pack ice is determined by the coldness of an Antarctic winter and the frequency and fury of wintry gales. Wind storms keep the water constantly stirred up so that there is little chance for the ice to become thick. Some years explorers have reported sailing through pack ice with little trouble. Other times the ice was a mean, tough foe to conquer.

Pack ice never disappears completely from the fringe of Antarctica. In the summer months it is usually broken up into floes by the warmer weather and movement of the water. These floes drift northward and eventually melt. The pack then be-

A typical flat or tabular Antarctic iceberg.

U.S. Navy



comes smaller in size. With the coming of winter and colder temperatures the water freezes and the pack grows. Floes made from the break up of pack ice may be only a few square yards in size or goliaths measuring several square miles in extent. Some early South Pole explorers found this frozen belt a hideous deathtrap for their ships. Shackleton was one who went through the agonizing experience of watching his sturdy, proud *Endurance* ground to splinters by the crushing force of pack-ice floes. Nowadays the pack is no longer too much of an obstacle or terror to explorers who come to the south-polar region with icebreakers. With their heavily reinforced bows and powerful engines, these ships can smash their way through the toughest sections of ice.

Usually, in places where the ice is thin, the knife edge of the icebreaker's bow cuts easily through the frozen field. But when thick ice is met, the ship must often charge it at full power and crawl up onto the ice with its bow. The weight of the vessel then crushes the ice. Sometimes the icebreaker must reverse its engines and charge the stubborn ice again and again before it breaks up.

Antarctica, stretching some 3,300 miles across its widest part and 2,500 miles at its narrowest, is the home of the world's largest supply of snow and ice. Scientists say that if all the snow and ice covering that immense land were to melt, the oceans of the world would rise 105 feet. Long Island, New York City, indeed, the entire Atlantic coast of the United States would disappear if such a disaster were to take place. Coastal regions throughout the world would be similarly affected.

Of all the many unusual sights that greet the eyes of the antarctic visitor, none, perhaps, is stranger than to see smoke curling from the top of one of that land's many mountain peaks. Despite its bleak, desolate nature, several active volcanoes are known to exist on the south-polar continent. One



U.S. Navy

Helicopter flying over Mt. Erebus, Antarctica's active volcano.

of the first known was Mt. Erebus, discovered by Admiral Sir James Ross. Located on Ross Island, the snowy slopes of Mt. Erebus rise to a height of 13,200 feet. Smoke spirals continuously into the sky from the volcano's lofty cone. Another volcano is on Bridgeman Island, and this is known to have erupted twice in recent times. According to some explorers, there may be other volcanoes on Antarctica, but it remains for future explorations to find them.

Although the greater part of Antarctica is covered by a thick layer of snow and ice, there are large areas of exposed rocky undersurface called nunataks. Explorers have found deposits of coal along with fossil remains of leaves in these bare rock surfaces. Shackleton brought back the first samples. To some scientists this was proof enough that when the world was in its early stages of formation, the Antarctic continent must have had a warm, perhaps even a tropical, climate. Geologists believe the period when forests existed on Antarctica was a little more than 300 million years ago. So far not much coal has been discovered on Antarctica. But there are veteran explorers, such as Admiral Richard Byrd, who feel that some of the world's largest coal beds are locked in the frozen surface. There is also a strong belief that other mineral treasures, such as iron ore, oil and uranium for atomic-energy purposes, lie hidden beneath the snow and ice.

Mainly because of the valuable minerals believed buried on Antarctica, countries like Great Britain, France and Australia have made territorial claims there. These claims are based on the achievements of their explorers, past and present. Argentina and Chile have also announced formal ownership of much of the Palmer Peninsula. Their claims have been made largely on the geographic nearness of the peninsula to South America.

The United States has not claimed any of Antarctica's territory nor does it recognize the claims of other nations. This country feels that rights of ownership are improper so long as it is impossible to permanently occupy and settle Antarctica. However, the United States has reserved for itself the future right to make territorial claims if political circumstances concerning Antarctica make it necessary. Should that time come, the United States would have a great deal of exploration work to its credit to support its position—ranging all the way from

Palmer and Wilkes to Byrd and the massive postwar Antarctic naval expeditions, to be discussed in the last chapter.

Attempting, in 1948, to settle the difficult problem of the ownership of Antarctica, the United States proposed that the south-polar continent be internationalized. Among other things, all nations claiming a part of Antarctica would have a voice in its overall affairs. The plan aroused only lukewarm interest, however, in other countries. The question of who owns Antarctica is still very much undecided and promises to remain that way for many years to come.

The weather of Antarctica is as interesting as the ice, mountains and all the other land features of that continent. Rain seldom falls. Any moisture in the air is quickly turned into snow or sleet by the intense cold. The world's fiercest winds and coldest temperatures have been reported from the land of the South Pole. Winds that could bowl a man off his feet were experienced almost daily by Dr. Mawson and his men when they lived through a winter on the Antarctic Continent. The average day-to-day wind velocity was fifty miles an hour. Often gusts four times as great raged across the expedition's camp.

The most powerful Antarctic winds are believed to blow along the seacoast, especially in the Wilkes Land region where Dr. Mawson had his winter camp. But the inland winds are no gentle breezes. Scott, Amundsen and Shackleton have all described the great difficulty they had with the wind on their inland marches to the Pole.

On the glaciers, the Polar Plateau and other open stretches of Antarctica, the constant wind forms the sastrugi into all sorts of odd shapes. These ridges of hard-frozen snow may range from two or three inches to more than a foot high, and they make difficult obstacles indeed for the sled parties. The

pioneer explorers who man-hauled sleds on their South Pole journeys spoke bitterly of these snow waves.

Companion to Antarctica's powerful winds is the frigid temperature. Again the world's southernmost continent can claim championship honors when it comes to lowering the thermometer's mercury. It is not unusual for the temperature to drop and remain quite steady in the minus 60's and 70's during an Antarctic winter. Up on the Polar Plateau, a record-breaking low of 80 degrees below zero has been recorded. This is 112 degrees below the Fahrenheit freezing mark! The Antarctic Continent is considered to be colder than the Arctic region by about 20 degrees.

In the Antarctic, fall, winter, spring and summer are the reverse of those in the Northern Hemisphere. March 21 is the beginning of fall, while we in the North are welcoming spring. June 21 is the start of the Antarctic winter, September 23 the start of spring, and December 21 the start of summer. Because there is so little difference between spring and fall on the one hand and winter on the other, Antarctica is said to have but two seasons—six months of daylight (summer) and six months of darkness (winter).

Antarctica's night season runs from March 21, when the sun is at the horizon on its downward winter journey, to September 23, when the sun is again at the horizon, this time on its summer climb upward. Darkness is not continuous throughout this six-months period of night. For about two months, a kind of twilight exists that slowly fades as the sun plunges far below the horizon. Nights become increasingly longer. There is another two months toward the end of the dark season when the sky slowly brightens, much like dawn, as the sun begins its upward journey. Real darkness, twenty-four hours long, cloaks Antarctica for about two months and extends through part of May, all of June and part of July.

Ordinarily, June 21 is the beginning of winter in the Antarctic. But to south-polar explorers the date has a different significance. June 21 is called "Midwinter Day" because it is the halfway mark in the six-months season of night. The sun has reached its lowest point below the horizon and soon thereafter starts the climb back into the Antarctic sky. The occasion is turned into a holiday by explorers, with special meals and general merrymaking.

The season of darkness ends on September 23 as the six months of daylight begins. By this date the sun has climbed so that days and nights are of equal length—twelve hours. Soon after, daylight hours swiftly increase so that by December 21, the beginning of Antarctic summer, the sun is at its height above the horizon. The sky path which the sun now follows during the course of its daily rising and setting is that of a huge circle. The period of twenty-four hours of continuous sunlight lasts for about two months. December 21 not only marks the peak of the sun's climb above the horizon but is also the midpoint of the six months of daylight. It is during the summer months that follow that scientists and explorers carry out most of their activities on Antarctica. Temperatures then may climb as high as 20 above zero and fall to 20 degrees below zero.

The tilt of the earth's axis, rotation about this axis and the earth's journey around the sun are responsible for Antarctica's seasons of daylight and darkness. During the period of darkness the earth's position has tilted the south-polar region away from the sun. In the daylight season the earth's position has changed and tipped the Antarctic toward the sun.

Antarctica's intense cold makes this barren land a king-size refrigerator. Food left on this icy continent does not spoil. Some Holland-made Edam cheese, left in a depot by Captain Scott's men in 1911, was found by south-polar visitors in 1955 who

reported that it still had a fine taste. Admiral Byrd has suggested that the great mounds of surplus food stored in the United States could be better left on Antarctica. It would be less difficult and, perhaps, less expensive than present methods of keeping the food from spoiling.

Food is not the only thing that remains in a perfectly preserved state in the Antarctic climate. In 1947 explorers from Operation Highjump visited Captain Scott's old camp at Hut Point and found the timbers and boards to be as sound and sturdy as the day they were first used. Inside the shelter on a table was a copy of a London magazine, fresh and unfaded, as though it had just been put there by one of Scott's men. Going next to the English explorer's Cape Evans camp, used on the 1911 expedition, the Americans found matches which could still be ignited. They also saw the remains of one of Scott's dogs, standing on its four legs as rigid as a statue. Kept free of snow, perhaps by the ever-blowing winds, the frozen dog looked real and about to dash after its mates.

Cold germs cannot exist in the frigid temperatures of Antarctica. Visitors to the south-polar land never suffer from that all-too-common ailment of the civilized world. Those who come to Antarctica with colds, lose them after a few days. Ultraviolet rays, unusually heavy and powerful in the dust-free atmosphere of this portion of the world, also help to destroy disease germs.

On a clear Antarctic night the stars shine overhead with a crackling brilliance. Frequently during the winter season of the south-polar year visitors are treated to spectacular heavenly displays by the aurora australis. Scientists believe these are formed by electrical disturbances in the atmosphere although much further study is required before they are understood completely. They flicker across the night skies in shimmering curtains and streamers of different shades of green, yel-

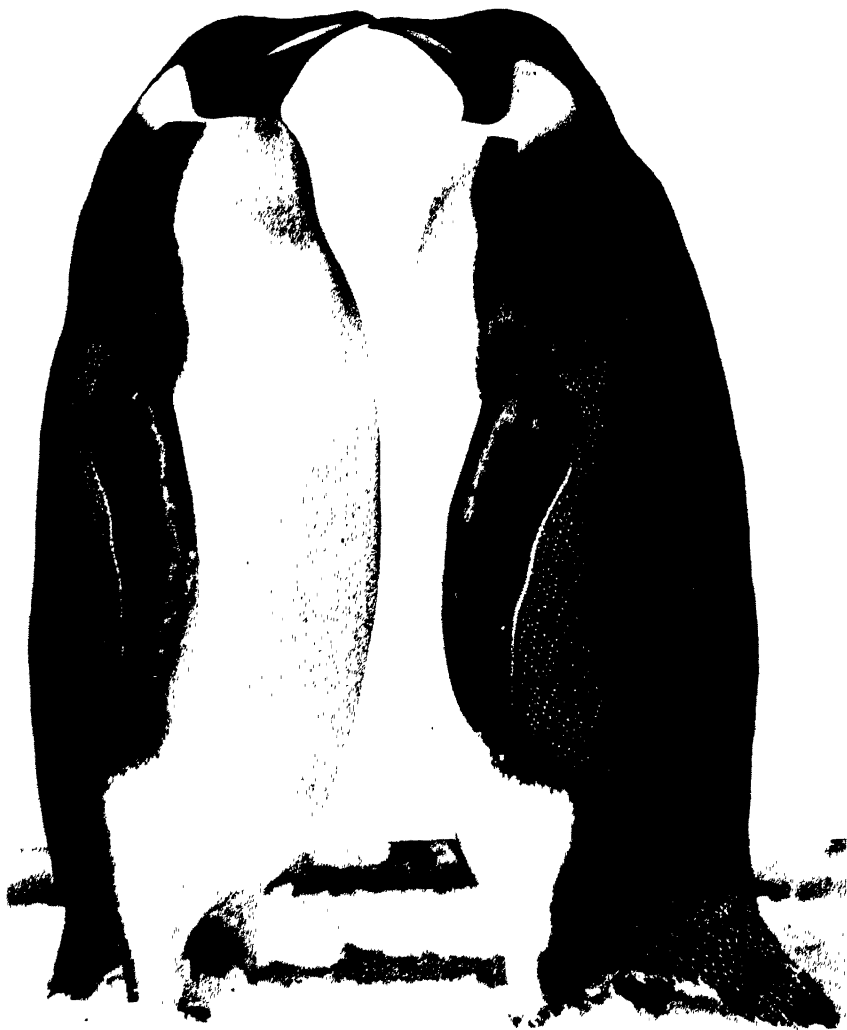
low, pink and red. Flashing from horizon to horizon the aurora is always an awesome, beautiful sight.

Except for temporary visits by penguins, seals and birds during the mating season, there is no animal life on Antarctica. Neither is there any plant life, unless one counts lichens, moss and fungi, the lowest forms of growing things. Penguins, half bird and half sea creatures, have been a never-ending source of interest and delight to Antarctic explorers. They have lived in the Antarctic region a long, long time. Fossil remains of penguins have been found that go back to prehistoric times. There are about fourteen species of these south-polar inhabitants. Two of the best known are the Emperor and Adélie penguins.

The Emperor penguin is the larger of the two, standing about four feet high and weighing close to eighty pounds. The Emperors were the official greeters when Amundsen and his men arrived on the continent to set up Framheim. The creatures stood about in groups and watched with great curiosity as supplies were unloaded from the expedition's ship, the *Fram*.

The penguins have little fear either of man or other surface animals. But sometimes they strolled too close to Amundsen's ferocious Huskies, and then there would be one less among the penguin population.

One night while Amundsen and his companions were asleep, they heard a strange noise outside their tent, repeated again and again. Pushing aside the tent flap, the Norwegian explorer was confronted by an Emperor penguin making squawking sounds and bowing continually. The performance was comical, and it seemed as though the creature had been chosen by his mates to make an official welcome to the strange visitors. Amundsen was so amused he called his comrades and they all had a good laugh.



U.S. Navy

But the explorers were weary and wanted sleep after a hard day's work so they chased the noisy penguin and returned to their sleeping bags. The creature was persistent, however, and came back again and again to repeat his welcoming act. Finally, to end the annoyance, the explorers were forced to kill the bird and add the meat to their food supply.

The Emperor penguins are the only ones to mate and raise their babies in the middle of the fierce Antarctic winters. Furthermore, they do not use nests in which to hatch their eggs. An Emperor penguin, which lays but one white egg, places this on the top of its web feet and then covers it with a loose fold of skin. As it crouches down, the underside of the penguin's body keeps the egg warm.

The Adélie penguin was first seen by the French explorer, Admiral d'Urville, who named the creature after his wife. The Adélie is about two and a half feet high. Compared with the Emperor penguin, who is quite dignified, the Adélie birds are more fun-loving. For hours on end they will amuse themselves by diving from a high ledge of ice into the water and frolicking about. When traveling over ice or snow, they either walk upright on their short legs or flop over and slide along on their bellies, using their legs to propel themselves.

Penguins live largely on the pack ice and the numerous islands that lie close off Antarctica's coastline. Although they appear awkward and clumsy on land, walking with a waddling motion, they are extremely graceful while swimming in the cold sea. The paddle-like flippers of the penguins are very powerful and permit them to move through the water with surprising speed. The flippers also enable the penguins to leap as high as six feet out of the water, which they often do while swimming. Penguins gather their food from the sea, which is rich in marine life. For this reason the birds are always within short distance of open water. During the Antarctic summer Adélie penguins, along with most other species, swarm onto rocky ledges where they build nests to raise their young. These nesting places, called rookeries, are noisy and foul-smelling. When penguins prepare to invade the Antarctic Continent they first send a scouting party ahead to look for the best rookeries. They may travel as much as 400

miles over snow and ice and through the water to reach their nesting grounds. A day or two after the "scouts" have made their "report," the main army of penguins begins to arrive on the Antarctic shore in twos and threes.

The female penguin, with some help from her male companion, has the job of building the nest. To do this she uses small stones and the bones of penguins that have died on the rookery in past years. Since the materials for building the nests are very scarce, a great deal of robbery goes on among the birds. This causes loud squawks and much fighting. When a thief is caught stealing a stone, he is punished with sharp pecks not only by the owner but by other penguins too, who just love to get into a fight. While the fights are raging, some penguins will slyly help themselves to the stones of the unprotected nests.

The Adélie penguin lays two white eggs. During the hatching period the penguin crouches over these in the bottom of the nest. The eggs are never left uncovered until the baby chicks appear. The most violent blizzards may cover the rookeries with a deep blanket of snow, but the birds will stick to their duty.

Lincoln Ellsworth tells of the time when he and his companions tried cooking penguin eggs. The eggs made delicious omelets but when they were boiled—ugh! They bounced like rubber balls and had a disagreeable fish taste.

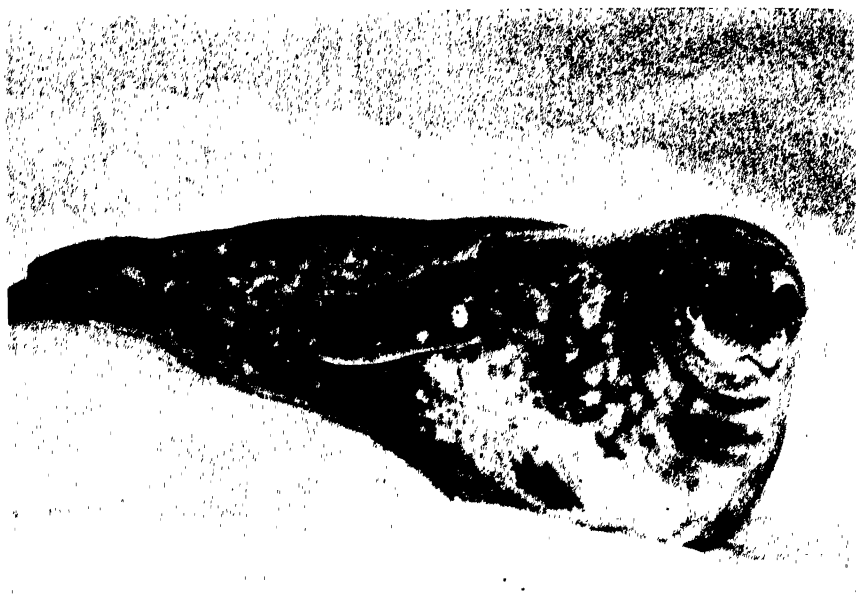
Once the eggs are hatched, both mother and father penguins are kept busy feeding and bringing up their babies. The baby penguin places its head inside the parent's mouth to reach food that is half-digested. The parents shelter the youngsters with their bodies when bad weather strikes. But the skua gull is the biggest danger to baby penguins. If the young are left unguarded, the savage skua bird will swoop down and kill them on the spot or carry them off. When this happens,

the parent penguins become very unhappy and wander about the rookery moaning aloud over their loss. They will then try to steal one of their neighbor's youngsters.

Penguins are feathery gray balls when first born. Within a few weeks, they begin to acquire the same coats as their parents, white breasts and dark slate-colored backs. When the young penguins are through changing their coats, the time has come for them to begin traveling with their parents. Fathers and mothers lead their young into the sea where the babies learn to catch their own food. Penguins live on fish and a shrimplike sea creature called a "krill." While swimming from floe to floe or to one of the offshore islands, penguins have to be on guard against still other enemies—sea leopards and whales. Often when whales spot penguins resting on a floe, they will tip over the ice with their snouts and knock the penguins into the water for a meal.

Some of the other bird species common to the Antarctic are the skua gulls, snow petrels, giant fullmars, with a wing span of almost nine feet, and Wilson's storm petrels. The storm petrels journey all the way from the northern United States and Canada to raise their young on the shores of Antarctica. Visitors to the Antarctic Continent are also greeted by seals. Several varieties inhabit the offshore islands and pack ice. Two of the most common are called the Weddell seal, after the English explorer, and the crab-eater seal. There is a third but rarer type known as the Ross seal. Not more than a hundred of these creatures have been reported seen since they were first discovered by Admiral Sir James Ross in 1840. The Ross seal is about eight feet in length and weighs 500 pounds.

The crab-eater seal has been described by some explorers as the friendliest and most interesting of the seals of the south-polar land. Ranging in size from six to eight feet long, the crab-eater has a gray coat dotted with small dark spots. It



U.S. Navy

The Weddell seal is one of several species found in the Antarctic.

travels over snow and ice with surprising speed, using a snake-like motion of its body. Explorers have seen it leap with very little effort right out of the water and onto an ice floe. The mortal enemy of crab-eater seals is the killer whale.

Slightly larger in size, the Weddell seal is considered much lazier than the crab-eater. It does little moving about and spends most of its time sleeping. During the stormy Antarctic winters, Weddell seals crawl into crevasses for protection. Frequently they become prisoners in these ice shelters and then must chew their way to freedom. As with the other seals, the Weddell creature has little fear of man. If its sleep is disturbed by pokes from a stick, it lets out a loud bellow, and then falls back into slumberland.

Like the penguins, seals come to the shore of the Antarctic Continent mostly to raise their young. They begin to arrive

from their winter homes on the offshore islands or pack ice during the short spring and summer weeks. Although seal meat would probably never find favor on our dinner table, old-time south-polar explorers and even some of more recent times have been thankful for it. In some cases, the blubbery carcasses of the seals kept them from starving. Many explorers, such as Amundsen, preferred seal meat to the salted or dried meats which they brought from home. These men strongly believed that fresh seal meat did much to prevent scurvy among expedition members.

The icy waters around the Antarctic teem with marine life. The most fantastic creature to make his home in the Antarctic seas is the whale—the largest living mammal in the world. Great schools of whales inhabit the waters of the south-polar region making it a rich hunting ground. One of the favorite Antarctic areas for whales is the large, scooped-out section in the Ross Ice Shelf which Shackleton first discovered and called the Bay of Whales. Fleets of specially built ships, floating factories really, from Norway, Great Britain, Russia and other countries, cruise through the Antarctic seas hunting whales. When whales are caught their carcasses are hauled up through a special opening in the ship's stern. Huge chunks of blubber from the creature's body are then removed, cut up and boiled. Whale oil is used for special industrial purposes, and to make soap and margarine.

The blue whale, sperm whale, finback and orca or killer whales, among others, are found in Antarctic waters. The blue whale is the largest of all and highly prized by whalers. This sea monster often stretches more than ninety feet from nose to tail flukes and weighs in excess of 120 tons. Its massive bulk would easily fill two railroad boxcars. Whalers are delighted when they land a blue whale because it usually means another 160 barrels of valuable oil for their cargo.

Killer whales, brown in color with white bellies and sporting a long dorsal fin, average about twenty-five feet in length. Although smaller than the blue whale, killers more than make up for their lack in size with a ferocious, murderous disposition. South-polar explorers have been all too familiar with the cold, evil eyes of killers and their vicious, giant teeth. Killer whales are the scourge of the Antarctic seas. Seals, penguins and even other whale species live in deadly fear of this savage giant. Because of their habit of swimming in packs, killer whales are sometimes called "the wolves of the sea." They hunt their food both in and out of the water. Krills, scooped up in enormous amounts, provide their everyday food. But when the creatures want a change in diet they hunt for penguins, seals and even man, if they can find one.

Like others of their kind, killer whales must rise to the surface for air. They shoot upward head first so that their snouts are about five or six feet out of the water. In one swift glance they survey a surrounding field of ice floes for possible victims. If a seal or penguin is spotted on a floe, the whale dives underwater to his expected meal. By some uncanny means, the whale knows when it is beneath the right location and zooms to the surface, smashing the ice with its huge body. The surprised quarry is toppled into the water as the ice floe is tilted sharply on end or turned over completely.

Killer whales hunt for human flesh in the same way. Captain Scott told of an anxious moment when a school of these giants almost caught Ponting, the expedition's photographer, and a team of his Husky dogs. Ponting and the dogs were out on the pack ice not far from the *Terra Nova*, Scott's south-polar ship. In an open-water area a short distance away, several whales suddenly poked their heads into the air and then slipped beneath the waves again. A short time later the ice quite close to Ponting and the dogs suddenly exploded. A shower of ice

and water flew high in the air as the whales broke through the thick ice with their huge, powerful bodies. Ponting and the dogs, almost knocked off their feet by the shock, scrambled to safety as quickly as they could.

Admiral Richard Byrd tells another story about killer whales. During the explorer's first visit to the Antarctic, he and two of his men were out in a small motorboat looking for a good place at the edge of the Ross Barrier to moor the *Bolling*. Suddenly the spouts of a school of whales were seen in the distance. The men were fascinated by the antics of the mighty creatures which they were seeing for the first time.

The whales kept getting closer and closer when it suddenly dawned on the explorers that the killers were heading in their direction. Byrd quickly ordered the boat turned toward shore and opened the throttle wide. A race developed between the whales and explorers with the whales gaining rapidly. But Admiral Byrd and his companions got to the edge of the ice first and dashed a good distance up the sloping beach of ice before turning to look for their pursuers. The killers broke through the water not more than fifteen feet from the boat, expecting to find their meal, and churned the water in a frenzy of disappointment.

Killer whales also attack other whales, many a good deal larger than themselves. It is doubtful whether a fight among jungle beasts can surpass in ferocity a battle between a killer and his whale victim. Rarely has one of these awesome death struggles been seen by man. One of the few reported was witnessed by Lieutenant Wilkes' expedition. Sailing through a calm sea one day, the American explorers saw a huge patch of water thrashed into boiling white foam. As the ships drew closer, the men could plainly see that a killer had clamped his savage teeth on the lower jaw of another whale. The latter twisted wildly and beat the water with thunderous blows of

its huge tail in an effort to shake off the attacker. The movements of the two deep-sea monsters became more violent as the climax of the battle was reached. "The whale threw himself at full length from the water, with open mouth, his pursuer still hanging by the jaw, the blood cascading from the wound and dyeing the sea to a distance round; but all his flounderings were of no avail." When death ended the struggles of the loser, the killer whale ripped out the tongue of its victim and ate it. This is believed to be the only part of whale meat which killers like.

From all that has been said so far, it is easily seen that Antarctica is not a friendly place to live. In order to survive, every item necessary to man's existence must be imported—food, clothing, fuel, transportation, shelter. Aside from scientists, explorers and whalers, there is no reason why anyone would want to go to Antarctica. But this may someday change, especially if valuable ores are discovered and it is found economical to mine them. Should this occur, permanent settlements would be required.

Will it be possible for man to live permanently on Antarctica? Some scientists think so. They base their belief on the great technological wonders of our time as well as those that can be expected in the future. Atomic energy, for example, might very well be the key to the future development of Antarctica. This fabulous source of power could provide all the light, heat and other energy needs for south-polar settlements for years on end.

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ANTARCTIC LABORATORY

DURING the years 1957–58, Antarctica will be explored and studied as it has never been in its past history. The reason for this will be a scientific project called the International Geophysical Year. This is a program of study carried out every fifty years by scientists in different countries throughout the world in order to find out a little more about the world we live in.

The first Geophysical Year was held in 1882, at a time when there was a good deal of interest in the Arctic region. As a result, scientists decided to concentrate their research studies in that part of the world. The second Geophysical Year got under way in 1932. The next one was scheduled for 1982 but because science has made such enormous advances in the past twenty years, it was decided not to wait so long. Instead, the year 1957 was chosen for the beginning of the third Geophysical Year. For one year and a half, scientists will use the entire world and portions of outer space as their laboratory, studying the inner core of the earth, the oceans, the weather, the atmosphere, cosmic rays, magnetic forces and numerous other subjects. However, since the Antarctic Continent is the

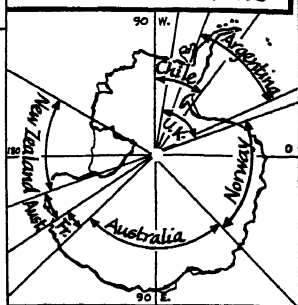
least-known area left on this earth, scientists have elected that region on which to pinpoint most of their research activity.

Eleven nations plan to send teams of scientific experts to Antarctica as their contribution to the Geophysical Year. Each team will study such subjects as weather, glaciers and magnetic forces. At the end of a little more than a year, the scientific information collected will be pooled and examined in great detail. It may be a long time, perhaps several years, before scientists will know the value of the data which they gather. Much new knowledge will be obtained from this huge research project, not only about Antarctica, but also about many of the physical forces that are part of our earthly planet. One of the fields in which scientists expect to become better informed is the weather—especially how it originates.

Because so much of Antarctica has yet to be seen by human eyes, exploration will form a good part of the Geophysical Year's work on that continent. An exhaustive search for minerals, coal, oil and uranium will be carried out.

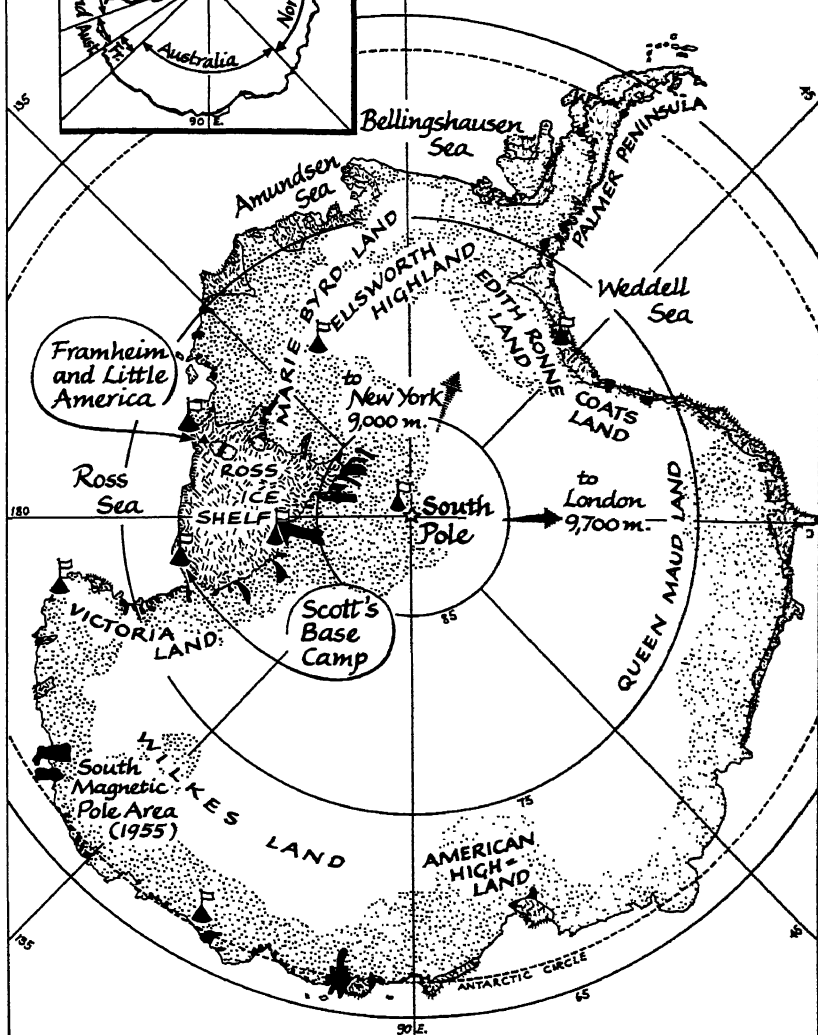
In order for the scientists to perform their research activities in the best possible manner, elaborate plans have been made for setting up bases. Great Britain and the United States have the most ambitious plans. America intends to establish no fewer than seven bases in various parts of Antarctica. Two will be main stations located near the coast. These will have the job of providing food, fuel and other supplies to the five inland bases. One of the more interesting inland bases to be manned by American scientists will be located directly at the South Pole. This outpost will be occupied by a team of scientists headed by Dr. Paul Siple, a veteran Antarctic explorer. Dr. Siple made his first visit to Antarctica as a nineteen-year-old Eagle Scout with Byrd's 1928 expedition. Dr. Siple will be making his sixth visit to the land of the South Pole during the 1957 portion of the Geophysical Year.

POLITICAL CLAIMS



Adapted from FOCUS, American Geographical Society

ANTARCTICA



U.S. Bases for International Geophysical Year



Explored and discovered land areas

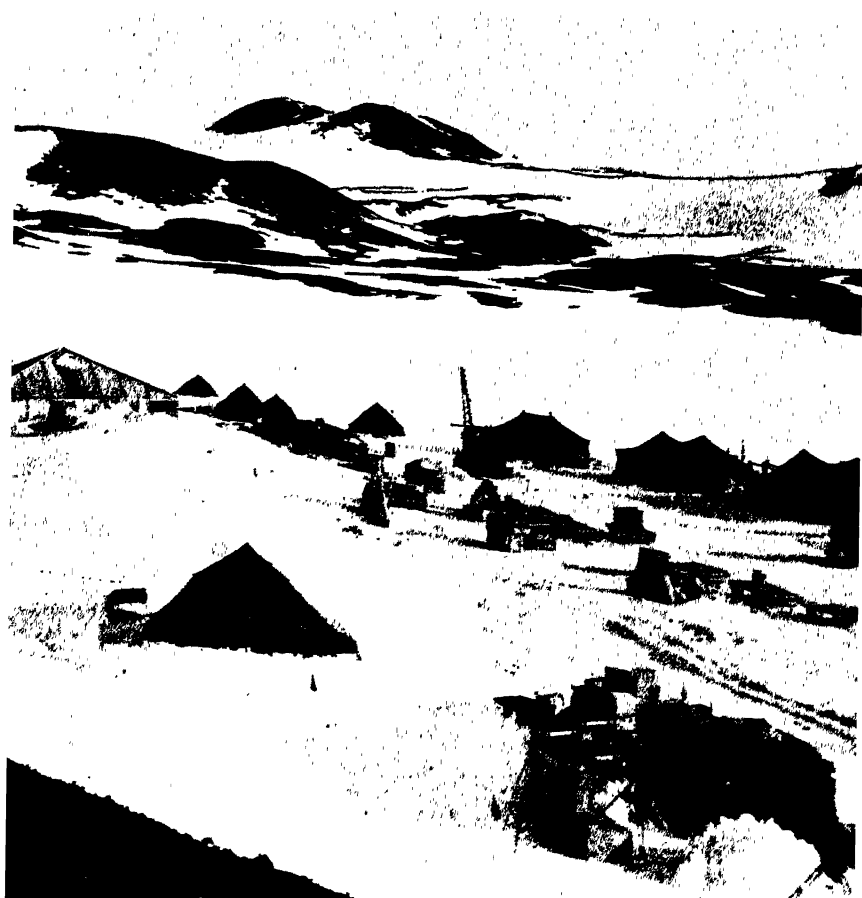


Glaciers

The United States started to establish its Antarctic bases October 30, 1955, when it dispatched Naval Task Force 43 to the south-polar continent. The overall activities of this expedition, called Operation Deepfreeze I, were commanded by the veteran explorer, Rear Admiral Richard E. Byrd. This was the fifth visit to Antarctica by Byrd. Rear Admiral George J. Dufek, another experienced polar traveler, was in command of the task force fleet of seven ships. This included three powerful icebreakers as well as cargo ships and oil tankers. The Deepfreeze expedition also brought 1,800 men, fourteen airplanes and close to 10,000 tons of cargo to Antarctica.

Among the expedition's modern equipment were the great variety of vehicles especially designed for operating on snow and ice. These included powerful tractors hauling sled-trains loaded with materials and supplies; massive rollers to flatten and compress snow for building sites and to smooth runways for the aircraft and, finally, tractor-buses for transporting the explorers around their frozen domain. Although Task Force 43 was equipped with the most up-to-date means for traveling over the snow, the time-tested, reliable Eskimo dog teams were not neglected. More than a hundred of the finest trained Huskies were brought along by the expedition.

Task Force 43 arrived at Antarctica on December 17, 1955, and a search was begun immediately for the two main bases. One was found near Captain Scott's old Hut Point camp on Ross Island in McMurdo Sound. Supplies and construction materials were rushed ashore, and battalions of Seabees—naval constructions forces who became famous during World War II—got to work quickly setting up the buildings for the base. The McMurdo Sound base is on the western side of the Ross Sea. Four hundred miles to the east, at Kainan Bay, another location was chosen. This is not far from the site of Admiral Byrd's old Little America. Byrd's earlier encampments



U.S. Navy

United States Geophysical Year base at Hut Point, Ross Island.

were buried beneath snow so deep that they were no longer accessible. The radio masts, originally sixty feet high, now showed only a few feet above the giant snow drifts. Some of the shelters had also disappeared, probably carried away when huge pieces of the Barrier crumbled into the sea. Because it was the fifth in a series of such camps, the base at Kainan Bay was called Little America V and was formally dedicated with a flag-raising ceremony on January 4, 1956.

Little America V is a sprawling modern community of seventeen buildings. These contain sleeping and eating quarters, a library, recreation center and scientific and mechanical workshops. Half the force of 167 men who volunteered to remain on Antarctica through the long winter night lived at the Little America base. Everything possible was done to make these men reasonably content and happy. Their living quarters had the luxury of carpeted floors; movies and radio were available; hi-fi phonographs and a well-stocked library were provided.

On February 16, 1956, Operation Deepfreeze I completed another important part of its job by unloading more than 9,000 tons of supplies and equipment at the McMurdo Sound and Kainan Bay bases. Enough material was landed to fill 500 rooms the size of the average living room. The greater part of this cargo was hauled inland on huge sleds drawn by powerful snow tractors. The work was neither easy nor safe. One of the tractors fell into a crevasse, carrying its driver to an icy death. With the McMurdo and Little America bases snugly secured for the winter, Task Force 43 got away from the continent before it was frozen in. Satisfied that everything was moving along on schedule, Admiral Byrd had already left Antarctica on February 3 for the United States.

The American Antarctic forces resumed work on the smaller inland bases in November of 1956. Particular attention was given to the base at the South Pole. On November 1, Admiral George Dufek flew down to the site for a tour of inspection and, in doing so, his plane became the first ever to land at the South Pole. The Admiral and his party were also the first visitors to the Pole since the days of Amundsen and Scott.

Several weeks after the American Task Force commander made his inspection, Navy Seabees, construction materials, food and supplies of all kinds were flown to the area. Some of

the transport planes used for this mission were too big and heavy to land on the snow and cargo had to be unloaded by parachute. A tractor weighing several tons was among the items dropped in this manner. Thanks to surprisingly kind weather—only one day did the wind blow uncomfortably—the Seabees were able to complete the South Pole camp on schedule.

While the United States is planning to spread its scientific and exploration activities over a wide part of the Pacific sector of Antarctica—that portion facing the Pacific Ocean—British scientists expect to concentrate their work in the Weddell and Ross Seas regions. The English plan to build two main bases, one on the coast open to the Weddell Sea and the other edging on the Ross Sea coast. By doing this, they hope to carry out successfully an old dream of Shackleton's—to march across the Antarctic Continent from one sea to the other by way of the South Pole.

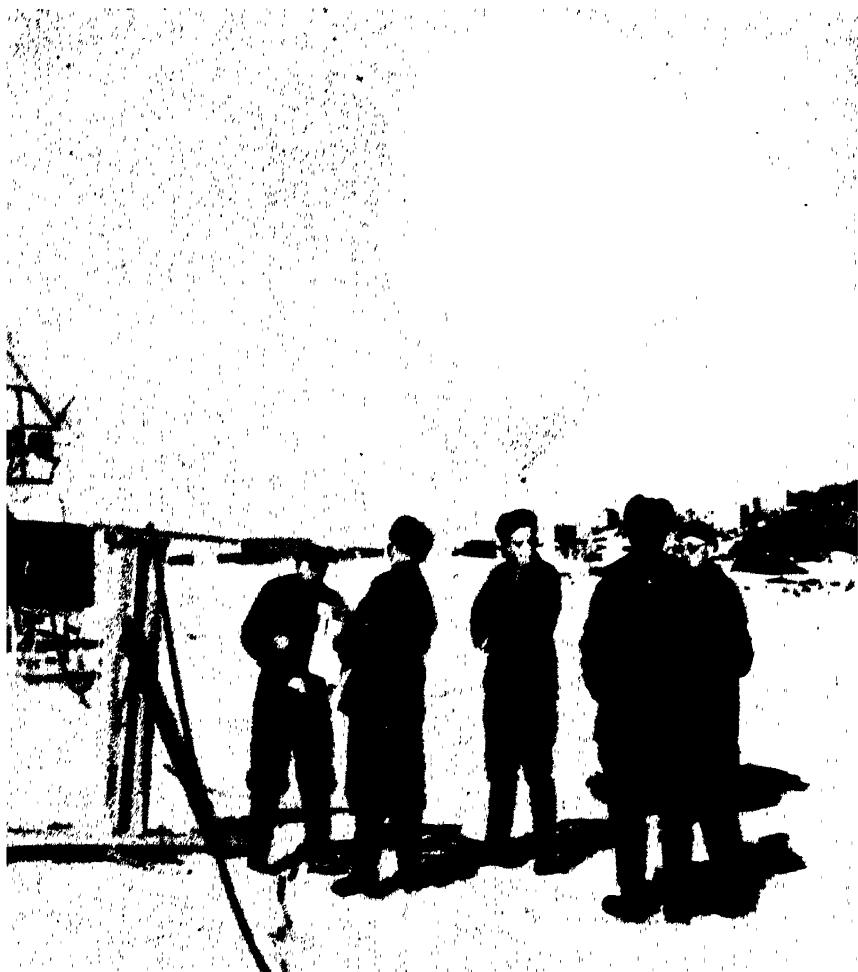
The British scientific team will use a motor-powered vehicle called a Sno-cat for their trans-Antarctic venture. This machine travels on four small tractor treads instead of wheels. Each of the treads works independently of the others so that the Sno-cat may be easily guided over rough, hilly surfaces. Another interesting piece of equipment to be used by the British is a portable aluminum bridge. About fourteen feet in length, this is expected to carry men and equipment safely over the many crevasses.

While the scientists are slowly making their way over the Polar Plateau, they plan to stop every twenty or thirty miles to drill holes in the ice. A dynamite charge will be dropped into the holes and exploded. By timing the return of the sound waves as they rebound from the rocky under-surface, they will be able to measure the thickness of the Polar Plateau's ice cap. The British-Swedish-Norwegian expedition of 1952 used this

same method, and in some areas not far from the Weddell Sea found the ice cap to be 8,000 feet thick.

The Russians were also active setting up Antarctic bases for the Geophysical Year. They have already built one called Mirny on the coast of Wilkes Land and plan two others farther inland. One of these is to be set up at the South Magnetic Pole. Admiral Byrd sent a friendly message of greeting to the Russian scientists about to send aloft a weather balloon.

Soviet Antarctic Expedition



sian scientists when they arrived on Wilkes Land. "Welcome to Wilkes Land. Hope you are having good luck finding your I.G.Y. site. . . ." However, Byrd was unable to send his greetings directly to the Russian camp, as the Russians did not let anyone know the wave-length they were using for sending or receiving radio messages. Byrd had to send his message by a roundabout route: first to the National Academy of Sciences in Washington, D.C., whence it was relayed to the Soviet Academy of Sciences in Moscow which finally flashed it to Dr. Mikhail M. Somov, leader of the Russians at the Antarctic base. However, communications between Little America V and the Russians' Mirny base were later established and messages exchanged.

In addition to the countries mentioned so far, others taking part in the Antarctic research program for the Geophysical Year include France, Argentina, Australia, New Zealand, Japan, Norway, Union of South Africa and Chile. The project will be a gigantic one with about fifty-five scientific bases scattered throughout Antarctica. Indeed, the entire program of the International Geophysical Year will be on a grand scale. As Admiral Byrd said: "It's the biggest effort of science in world's history to learn about this old world we've crawled around on for so long." When the scientists and explorers get through with their work of searching out Antarctica's secrets, ". . . we will at last have seen all of the world," said Byrd.

Unfortunately, the famous south-polar explorer died (March 11, 1957) while the Antarctic scientific program was still in its early stages. He believed that as a result of the mass visits during the Geophysical Year, Antarctica would no longer be such a lonely place reserved for the exclusive use of the penguins. There is a strong chance that there will always be a group of scientists or explorers on Antarctica to follow up the discoveries made during the Geophysical Year.

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